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IN THE

# Supreme Court of the United States

October Term, 1970

No. [redacted] 243

ERNEST SAMUEL NOSSEN and E. S. NOSSEN LABORATORIES, INC.,

*Petitioners,*

v.

THE UNITED STATES,

*Respondent.*

## PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF CLAIMS

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June 10, 1970

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**October Term, 1970**

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*Petitioners,*

v.

THE UNITED STATES,

*Respondent.*

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## PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF CLAIMS

The petitioners, Ernest Samuel Nossen and E. S. Nossen Laboratories, Inc., respectfully pray that a writ of certiorari issue to review the judgment and opinion of the United States Court of Claims entered on October 17, 1969, and the opinion entered on motion for rehearing on March 20, 1970. The review is sought in respect to the holding of invalidity of claims 7 and 9 of the patent in suit.

### Opinions Below

The opinion of the Court of Claims (App. A, *infra*) is reported at 189 Ct. Cl. 1; 416 F.2d 1362; (hereinafter "the original opinion"). The opinion on motion for rehearing (App. B, *infra*) is reported at 191 Ct. Cl. —; — F.2d —, 165 U.S.P.Q. 82, (hereinafter "the rehearing opinion").

## Jurisdiction

The judgment of the Court of Claims was entered on October 17, 1969. A timely motion for rehearing was denied on March 20, 1970, and this petition for certiorari was filed within 90 days of that date. The jurisdiction of this Court is invoked under 28 U.S.C. 1255(1).

## Questions Presented

### Introduction

The Court of Claims found claims 7 and 9 of petitioners' chemical process patent infringed but invalid. The alleged invalidity is entirely predicated on the disclosure of a 40-year old German patent[1] that was characterized by the court as containing "cloudy phraseology and *lacunae*". The issue, raised for the first time in the decision below, is whether a bed of particles, disclosed in the German patent, is above or below a critical temperature when sprayed with a solution. The court found that the bed is above the temperature but acknowledged that no temperature was stated in the German patent. No issue was tendered nor evidence adduced by the parties as to the temperature of the bed. As a matter of fact, the bed of particles is not mentioned in the entire trial record. Nor did the commissioner of the Court of Claims discuss the temperature of the bed in his two reports to the court.

On motion for rehearing, petitioners demonstrated that the bed of the German patent must necessarily be below the critical temperature and submitted supporting opinions of seventeen impartial chemical experts who did not know the respective positions of the court and the petitioners.

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[1] The government-supplied translation of the German patent (Gewecke patent, DX 14) is reproduced in Appendix C, *infra*.

The court refused to consider petitioners' showing on the sole ground that it had been "invited" during an earlier remand by the court to the commissioner.

The court's remand order, however, did not embrace the German patent, and the commissioner refused to hear evidence thereon during the remand and did not mention the German patent in his subsequent report.

The questions presented are:

1. Was the court's determination to fill the stated crucial "*lacuna*" of the foreign patent in conflict with the well established doctrine, first enunciated by this Court in *Seymour* v. *Osborne*, 11 Wall. 516, 555, that the disclosure of a foreign document must not be supplemented for invalidation purposes but "must be an account of a complete and operative invention capable of being put into practical operation"?

2. Was it error and violative of due process for the court, untrained in chemistry, to invalidate a chemical patent claim by supplementing, on its own initiative, the "cloudy" and "*lacuna*"-ridden teaching of the foreign reference patent to arrive at an invalidating interpretation, where the supplementation is totally devoid of evidentiary support and the invalidating interpretation has been rejected as untenable by the uncontroverted opinions of numerous chemical experts and supported by none?

3. Have petitioners been deprived of due process by the court's refusal to consider their substantive showing that the holding of invalidity on the foreign patent is factually wrong, where the refusal is based solely on the procedural premise that the showing had been "invited" by the court during an earlier remand before the commissioner, when the record demonstrates that no such showing had in fact been invited and the foreign patent was not before the commissioner who refused to hear evidence thereon during the remand?

4. Is a substantial due process question presented, justifying exercise of this Court's review power, where the court below found that the foreign reference patent is "cloudy" and would be ambiguous and hence non-anticipatory "if more than one construction (of the foreign patent) are all intelligible", but persisted in relying on the foreign patent although the court found, in the same breath, that *two* constructions of the foreign patent are all intelligible?

5. Was it error for the court to reject the presumption of validity of the patent in suit on the ground that the teaching of the foreign disclosure had not been before the Patent Office, when in fact the same teaching had been cited and considered by the Patent Office in the form of an American patent which contains the teaching in greater detail and with greater clarity than the foreign disclosure?

6. Was it compatible with due process first to invalidate petitioners' patent claims on the basis of statements imputed to but not made or suggested by the petitioners and then to deny petitioners the opportunity to demonstrate that they had not made or suggested the statements?

7. Was the court's refusal to consider the substance of petitioners' motion for rehearing, including the supporting opinions of seventeen impartial experts, compatible with the court's duty to dispense justice between citizens and the United States and the court's avowal that it must "seek the true meaning and intent of the (foreign) patent"?

8. Did the Court of Claims so far depart from the accepted and usual course of judicial proceedings as to call for an exercise of this Court's power of supervision to prevent a grave miscarriage of justice?

**Constitutional and Statutory Provisions and Rules Involved**

This case involves the Due Process Clause of the Fifth Amendment of the Constitution of the United States, Sec-

tion 1498 of Title 28 and Sections 101, 102, 103 and 282 of Title 35 of the United States Code and Rule 152 of the Court of Claims. The pertinent text of these provisions and rules is set forth in Appendix J, *infra*.

## Statement of the Case

An important stage in the production of uranium from uranium-bearing ores is the decomposition of water-containing uranyl nitrate solution into uranium oxide and nitric acid. The United States, through its Atomic Energy Commission (AEC), has decomposed uranyl nitrate solutions on a vast scale and by a conventional process since the Manhattan Project of the 1940's. This conventional process was an exceedingly time-consuming, expensive multi-stage procedure requiring elaborate equipment and involving operational hazards.

In the early 1950's, petitioner Dr. Nossen, a German born scientist of international reputation who came to the United States from Holland in 1948, developed a revolutionary metal nitrate decomposition process for which he was granted, in 1956, the basic patent in suit. The patent is reproduced in Appendix K, *infra*. Corresponding patents were obtained by him in foreign countries, including Germany, where the German Patent Court termed the Nossen process an important advance in decomposition technology (Tr 30, PX 7).[2]

The Nossen process turned out to be particularly beneficial in the decomposition of uranyl nitrate solutions. It not only avoided the drawbacks of the conventional process but, where the old process required several stages and several reactors, the Nossen process operates in a single step and a single reactor, resulting in high yield recovery of pure uranium oxide and nitric acid of high concentration.

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[2] "Tr" refers to trial transcript.

The AEC replaced the conventional process in its establishments by Nossen's new technology and praised its advantages in AEC publications (PX.25 and 40) without credit to Dr. Nossen.

Dr. Nossen offered the AEC a reasonable license under his patent. The offer was declined. Instead he was promised a position with the AEC provided, however, he would grant the government a royalty-free license. This was unacceptable because Dr. Nossen, and the corporation-petitioner founded by him, had made very substantial investments in the development of the process. When Dr. Nossen shortly thereafter became aware that the AEC had switched to his patented process, he complained to the AEC, but was repeatedly assured by its Patent Counsel that nothing even remotely resembling his process was practiced by any AEC establishment (PX 39L). The record demonstrates that these assurances were deliberate falsehoods (Tr 213-217; App. A, *infra*, Finding 27).

Dr. Nossen and his corporation thereupon brought suit in the United States Court of Claims for reasonable and entire compensation for the unauthorized use of their patented invention. The jurisdiction of the aforementioned court was invoked since, pursuant to Title 28, U.S.C. 1498, the Court of Claims has exclusive jurisdiction in respect to patent infringement claims asserted by a citizen against the United States. The petition sought compensation in the amount of twenty-four million dollars ($24,000,000) for past infringement. This amount was based on a four percent royalty, calculated from production figures published by the government.

After eight years of litigation, the court found the claims of the patent infringed by the AEC but invalid. The holding of invalidity is based entirely on the writings of a German chemist, a Dr. Gewecke, embodied in a German

patent[3] filed in 1927 (Gewecke patent, DX 14) and two articles that appeared in German chemical periodicals in the 1930's (*Die Chemische Fabrik*, DX 7 and 8, and *Chemiker-Zeitung*, DX 17). The remaining 53 (fifty-three) prior art documents referred to by the defense were not considered anticipatory.

The process of the Gewecke patent and the two Gewecke articles is neither concerned with nor can be used for the decomposition of uranyl nitrate solutions. Its purpose is rather the splitting of water-containing aluminum nitrate into aluminum oxide and nitric acid, by a water reaction known as hydrolysis.

Nossen's decomposition of uranyl nitrate solution, by contrast, does not proceed by way of hydrolysis, as recognized by the court (App. A, *infra*, Finding 27). While the court thus acknowledged that the chemical reactions involved in the Nossen and Gewecke processes are different, the court found that the *manipulative steps* of the two processes were the same.

The manipulative step of the Gewecke patent that, in the court's view, anticipates claims 7 and 9 is the spraying of the aluminum nitrate solution on agitated particles of aluminum oxide, as taught in the German patent. The court and petitioners agree that such anticipation would lie if the particles, at the time of spraying, were at least as hot as the decomposition temperature of aluminum nitrate, to wit, about 180°C. The court and petitioners also agree that the spraying step would not be anticipatory if the temperature of the particles, at the time of spraying, is below the decomposition temperature of aluminum nitrate, since the resulting solid aluminum nitrate-aluminum oxide mixture would then have to be further decomposed by subsequent treatment. The crux of the

[3] The government-supplied translation of the Gewecke patent is reproduced in Appendix C, *infra*.

matter is thus the temperature of the particles at the time of spraying. The court acknowledged that the Gewecke patent does not mention the temperature of the particles (App. A, *infra*, p. 6). Nor does the evidence shed any light on the matter since the particle bed, let alone its temperature, was not mentioned during trial. The issue of the temperature of the particle bed was raised for the first time in the original opinion of the court below.

By way of what may be termed a method of deductive exclusion and resort to suppositions, the court reached the conclusion that the particles must be above the pertinent temperature. The court thus reasoned that it does not make sense if the particles are below the temperature and that, therefore, it must necessarily follow that they are thereabove. In reaching this conclusion the court relied heavily on substantive statements imputed to but not made or suggested by petitioners.[4]

The decision below recognizes "the cloudy phraseology and *lacunae* that do indeed exist in the Gewecke patent" (App. A, *infra*, p. 7) and states that the Gewecke patent is ambiguous, and hence non-anticipatory, if a different interpretation than that found by the court is also credible. This was expressed on page 7 of the original opinion (App. A, *infra*) as follows:

> "But the display, brilliant as it is, gives little help to the court in seeking; as we conceive we must, the true meaning and intent of the (Gewecke) patent. In construing a document, you cannot beat an interpretation that makes sense with one that does not. *It is ambiguous only if more than one construction are all intelligible.*" (Emphasis supplied)

The original opinion applied all three Gewecke documents to some of the Nossen claims, but claims 7 and 9,

[4] The statements which were attributed to petitioners, but neither made nor suggested by them, are discussed in the motion for rehearing which is reproduced in Appendix G, *infra*.

here in issue, were invalidated on the teaching of the Gewecke patent alone. The court stated that claim 7 might also "possibly" be anticipated by *Chemiker-Zeitung* (App. A, *infra*, p. 15) but this statement presupposed that the agitated particle bed of the Gewecke patent, operating pursuant to the court's interpretation, is conjecturally incorporated into the procedure of *Chemiker-Zeitung* which does not mention any particle bed (App. A. *infra*, p. 9). To reduce the issues, petitioners acquiesced in the holding of invalidity of the other claims, but filed a timely motion for rehearing on the question of validity of claims 7 and 9.

Since the case was decided by the court, not on a point of law but rather on an unlitigated issue of chemical fact, petitioners' counsel submitted this chemical fact issue by letter to twenty-two impartial chemists and scientists of international distinction. The letter, reproduced in Appendix H, did not indicate which of the two submitted interpretations favors petitioners' position.

Seventeen expert opinions from scientists in six countries were received in response and submitted to the court with petitioners' motion for rehearing. Each of the expert opinions rejected the court's interpretation and supported petitioners'. Each of the expert opinions thus confirmed that the temperature of Gewecke's particle bed must necessarily be below the decomposition temperature of aluminum nitrate at the time of spraying. Several of the expert opinions also stressed the vagueness and general paucity of the Gewecke patent disclosure.

The government did not challenge the correctness of the views expressed in the expert opinions. The court, however, stated that it was "unnecessary" (App. B, *infra*, p. 6) to consider the showing, although the rehearing opinion acknowledged that petitioners' construction of the Gewecke patent is "clear and coherent" (App. B, *infra*, p. 5).

The sole ground on which consideration of the showing was deemed unnecessary was that it had come too late, since it allegedly had been "invited" (App. B, *infra*, p. 4) by the court during an earlier remand proceeding before the commissioner. The record demonstrates, however, that no such showing had been invited, that the Gewecke patent was not before the commissioner during the remand, that the temperature issue had not been raised at trial or by the commissioner, and that petitioners had in fact been prevented from adducing testimony on the Gewecke patent during the remand proceeding.

The court remanded the case to the commissioner in 1968 by an order which is reproduced in Appendix D, *infra*. The remand order speaks for itself. It is exclusively directed to "the Gewecke publications", to wit, *Die Chemische Fabrik* and *Chemiker-Zeitung*, and does *not* mention the Gewecke *patent* here in issue. It is also crystal clear from the record that the commissioner understood the remand order to *exclude* the Gewecke *patent*. The commissioner's supplemental report, rendered in compliance with the remand,[5] thus states *expressis verbis* that the court had remanded

> "the *two* Gewecke publications (which) are Gewecke —*Die Chemische Fabrik* and Gewecke—*Chemiker-Zeitung*" (emphasis supplied) (App. F, *infra*).

By motion pursuant to Rule 152 of the court below, petitioners moved for relief from the judgment on the ground that the denial of the motion for rehearing was predicated on a misconception since, as demonstrated, the remand order had not embraced the Gewecke patent. The motion included an affidavit reporting on a pretrial conference before the commissioner, during which petitioners' counsel had suggested that the term "the Gewecke publi-

[5] The first page of the commissioner's supplemental report is reproduced in Appendix F, *infra*.

cations", as used by the court, might perhaps have been intended generically to embrace all three Gewecke documents. The affidavit, which was not rebutted by any opposing evidence, confirms that the commissioner disagreed with this broad interpretation of the term and that he stated that no evidence would be heard on the Gewecke patent. As reported in the affidavit, the commissioner also indicated that the court might have excluded the Gewecke *patent* from the remand for the good reason that it had been properly offered and received in evidence, while petitioners had challenged the admissibility of the two Gewecke *publications* for non-compliance with a previous order that had required submission of all prior art documents before trial. The affidavit is reproduced in Appendix E, *infra*.

The Rule 152 motion also drew attention to the court's finding that the Gewecke patent would fail as an invalidating reference "if more than one construction are all intelligible" and that the court's recognition of petitioners' construction as being "clear and coherent" hence rendered the Gewecke patent non-anticipatory under the court's own finding.

The motion was denied by an order dated April 24, 1970. The order is reproduced in Appendix I, *infra*. It does not deal with the gravamen of petitioners' motion, but merely states that the commissioner did not refuse to hear evidence on the Gewecke patent during the remand, but if such refusal had actually been indicated, then petitioners should have sought review thereof at an earlier time.

## Reasons for Granting the Writ

The paramount reasons for granting the writ are that the supplementation of the missing crucial information in the German patent is in direct conflict with the doctrine,

enunciated by this Court that a foreign document must not be supplemented for anticipatory purposes, and that the court below, in first effecting the supplementation and then persisting to adhere to the incorrect result obtained thereby, so far departed from accepted judicial conduct as to deprive petitioners of their constitutional rights under the Due Process Clause of the Fifth Amendment of the Constitution.

**I. Supplementation of an incomplete foreign patent disclosure for invalidation purposes flies in the face of one of the best entrenched doctrines of patent law.**

The doctrine that a domestic patent shall not be invalidated by an incomplete foreign document was first proclaimed by this Court exactly 100 years ago, in *Seymour v. Osborne*, 11 Wall. 516, 555, where the Court in upholding the patent in suit stated:

> "Patented inventions cannot be superseded by the mere introduction of a foreign publication of the kind, though of prior date, unless the description and drawings contain and exhibit a substantial representation of the patented improvement, in such full, clear, and exact terms as to enable any person skilled in the art or science to which it appertains, to make, construct, and practice the invention to the same practical extent as they would be enabled to do if the information was derived from a prior patent. Mere vague and general representations will not support such a defence, as the knowledge supposed to be derived from the publication must be sufficient to enable those skilled in the art or science to understand the nature and operation of the invention, and to carry it into practical use. Whatever may be the particular circumstances under which the publication takes place, the account published, to be of any effect to support such a defence, must be an account of a complete and operative invention capable of being put into practical operation."

The *Seymour* doctrine has been the law of the land ever since. It has been reiterated by this Court on several occasions in respect to both foreign and domestic patents. *Cohn* v. *United States Corset Company*, 93 U.S. 366; *Downton* v. *Yeager Milling Co.*, 108 U.S. 466; *Eames* v. *Andrews*, 122 U.S. 48. It has been followed and cited in scores of decisions of appellate courts.[6] The Court of Appeals for the Ninth Circuit, in referring to the *Seymour* decision, stated in *Carson* v. *American Smelting & Refining Co.*, 4 F.2d 463, 465:

> "A foreign patent is to be measured as anticipatory, not by what might have been made out of it, but by what is clearly and definitely expressed in it. An American patent is not anticipated by a prior foreign patent, unless the latter exhibits the invention in such full, clear, and exact terms as to enable any person skilled in the art to practice it without the necessity of making experiments."

There is no doubt that the decision of the court below is in clear and direct conflict with this rule. After having acknowledged that the German patent is "cloudy" and would only anticipate if the temperature of the particle bed is

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[6] For example:

2nd Circuit: *Dewey & Almy Chemical Co.* v. *Mimex Co.*, 124 F. 2d 986;

3rd Circuit: *Hanifen* v. *Armitage*, 117 Fed. 845;

5th Circuit: *Bros. Incorporated* v. *W. E. Grave Manufacturing Company*, 351 F. 2d 208;

6th Circuit: *Aluminum Co. of America* v. *Sperry Products, Inc.*, 285 F. 2d 127;

7th Circuit: *Borg-Warner Corp.* v. *Mall Tool Co.*, 220 F. 2d 803; *General Electric Co.* v. *Haskins Mfg. Co.*, 224 F. 2d 464;

8th Circuit: *Wisconsin Alumni Research Foundation* v. *George A. Breon & Co.*, 85 F. 2d 166.

> "say, 180°C, but the patent nowhere expressely says this" (App. A, *infra*, p. 6),

the court, under the prevailing rule, had the duty to reject the German patent as an anticipatory reference.

Although the court below pays lip service to the rule by referring to one of its earlier decisions, *Badowski* v. *United States*, 135 Ct. Cl. 93, 140 F. Supp. 544 (App. A, *infra*, p. 8), the fact remains that the focal information is missing in the German patent and was supplied by the court on its own initiative and without evidentiary support.

The court's conduct is particularly censurable in the light of the importance of the case and the nature of the subject matter. *Marconi Wireless Tel. Co.* v. *United States*, 320 U.S. 1; *United States* v. *Adams*, 383 U.S. 39, 41.

The Nossen process has saved the government tens of millions of dollars. Infringement has been established. The Nossen and Gewecke patents are concerned with complex chemical processes. The Court of Claims has no expertise in chemical technology.

Mr. Justice Frankfurter stated in *Marconi, supra*:

> "It is an old observation that the training of Anglo-American judges ill fits them to discharge the duties cast upon them by patent litigation. . . . But consciousness of their limitations should make them vigilant against importing their own notions of the nature of the creative process."

Rather than heeding this advice, the court ignored the expertness of the Patent Office and the cloudy language of the German patent, and embarked instead on a speculative venture in an unfamiliar and notoriously difficult scientific discipline.

**II. The deductive reasoning employed by the court below in justifying the filling of the crucial "*lacuna*" deprived petitioners of due process since it is predicated on statements imputed to but not made or suggested by petitioners, Gewecke or the German Patent Office.**

The court below compounded its error by justifying the supplementation by a deductive reasoning, which not only discounted the plain meaning of the scanty information actually contained in the Gewecke patent, but which also imputed to petitioners a number of nonsensical statements that had not been made by them. The court thus rejected petitioners' interpretation of the Gewecke patent as unintelligible on the basis of three suppositions which were falsely attributed to petitioners. These three suppositions have no basis in fact or in the record and impute to petitioners exactly the opposite of what petitioners had *expressis verbis* contended throughout the proceedings before the court and the commissioner. The three suppositions are discussed and repudiated in petitioners' motion for rehearing, as reproduced in Appendix G, *infra*.

An additional factor which contributed to the court's erroneous conclusion was the admiration expressed for the German patent system and its patrons. The decision thus finds that the court's interpretation

> "postulates a concept that a member of the most brilliant scientific community in the Western world—as that of Germany was reputed to be—might conceivably have deemed it worthwhile to patent" (App. A, *infra*, p. 8)

while, by contrast, petitioners' interpretation

> "imputes to the German Patent Office the ultimate absurdity *of patenting a process to make nitric acid* in which the disclosures stop short of any production of nitric acid" (App. A, *infra*, p. 7) (emphasis is ours).

This reasoning overlooks that the Gewecke patent is not for "a process to make nitric acid" but claims and discloses a process to decompose aluminum nitrate solution (App. C, *infra*), and, most important, that the German

Patent Office, so highly regarded by the court below, granted patents to both Dr. Gewecke and the German-born Dr. Nossen on their respective inventions.' What the court is doing here is in fact simultaneously praising the German Patent Office and imputing to it the ultimate absurdity of granting two separate patents in the same German patent class and on the same invention to two different persons. Surely, such imputation is less intelligible than one which recognizes that the first patent was for an invention different from that of the second one.

### III. The holding of invalidity is so totally devoid of evidentiary support as to render it unconstitutional under the Due Process Clause of the Fifth Amendment.

The question here turns not on the sufficiency of the evidence but on whether the holding of invalidity rests on any evidence at all. *Thompson* v. *City of Louisville*, 362 U.S. 199; *Garner* v. *Louisiana*, 368 U.S. 157, 163.

The record is utterly barren in respect to the temperature of the particle bed. The particle bed, let alone its temperature, is not mentioned in the entire trial record. The issue of the particle bed was raised for the first time by the court in its original opinion, and not during trial. By assuming arbitrarily a temperature of the particles above the critical temperature of 180° C, the court arrived at a construction which combined the production of a solid product and its decomposition into a single-step operation while, by contrast, Gewecke's patent clearly discloses two separate consecutive operations, although the details of the operations are not disclosed. Thus, while the court states in the original opinion (App. A, p. 7, *infra*) that Gewecke "must intend in his own 'continuous' process to spray, mix, and heat simultaneously, though he does not say so expressly", the Gewecke patent proper states exactly the opposite by emphasizing that "*prior* to decomposition . . . a solid product (is created) which preserves its properties as a solid during the *entire* heating process" (App. C, p. 7a, *infra*). The court's construction is thus contra-

dicted by the only evidence available, to wit, the plain wording of the Gewecke patent.

The court below states that "defendant's expert witnesses construed the Gewecke patent according to their position" (App. A, *infra*, p. 7). This statement is grossly misleading because, in the given context, it falsely implies that defendant's experts testified on Gewecke's particle bed or its temperature. The fact is that they did not, and neither the government nor the court have been able to show otherwise. The testimony of defendant's experts attempted to equate the Gewecke process with that used by the AEC but did not elaborate on Gewecke's manipulative steps. It is significant, in this context, to note that the two government witnesses appeared to be unfamiliar with the relevant chemical technology. Mr. York thus disqualified himself by stating:

> "I would say I am not a chemical expert" (Tr 830) and
>
> "I frankly have to say that I am no expert on this" (thermal decomposition) (Tr 844).

The second witness, Dr. Lawroski, conceded that he was "an administrator" and had not dealt with the relevant chemistry since his student days some thirty years ago (Tr 662, 669).

It follows that there is not a scintilla of evidence which could conceivably justify the court's extraordinary conduct in assuming the role of an expert witness in a scientific field in which the court has no expertise. *Washington* v. *United States*, 357 U.S. 348.

**IV. Since the court below has found that petitioners' interpretation is "clear and coherent", the German patent is non-anticipatory under the court's decision, and the court's refusal to draw the correct consequence of this finding is violative of Due Process.**

An extraordinary aspect of this case is that although the decision below actually acknowledges the non-anticipa-

tory nature of the Gewecke patent in so many words, the court has refused to draw the correct consequence of this acknowledgment. Not only did the court recognize that the German patent is "cloudy", contains "*lacunae*" and is of "poor phraseology", but the decision also states that the German patent would be ambiguous and hence non-anticipatory "if more than one construction (of the Gewecke patent) are all intelligible" (App. A, *infra*, p. 7). The court, however, also found that petitioners' construction of the Gewecke patent is "clear and coherent" (App. B, *infra*, p. 5) and thus intelligible. It follows that *two* constructions of the foreign patent are considered intelligible by the court, to wit, its own and petitioners' and the decision is thus contradictory to the court's finding.

The confusion is compounded by the statement that the court could not determine, without expert testimony, whether petitioners' interpretation "is more credible" (App. B, *supra*, p. 4) than that adopted by the court. Since the court found that *any two* intelligible constructions of the Gewecke patent would render it ambiguous, petitioners' construction thus need not be "more credible" than that of the court. The court's refusal to draw the correct consequence of its own finding is a glaring example of unconstitutional conduct.

**V. The presumption of validity of the Nossen Patent is strong since the Gewecke process was exhaustively considered by the Patent Office.**

It is well settled that the statutory presumption of validity which attaches to a patent (35 U.S.C. 282, App. J, *infra*) is strong when the relevant prior art has been considered by the Patent Office. *Mitchell* v. *Tilghman*, 10 Wall. 287, 380; *Williams Mfg. Co.* v. *United Shoe Mach. Corp.*, 121 F.2d 273, 277 (CA. 6), aff'd 316 U.S. 364.

Chief Judge Lumbard of the Second Circuit stated in *Georgia Pacific* v. *U. S. Plywood Corp.*, 258 F.2nd 124:

> "There are other factors, however, which we must consider. One is that plaintiff is attacking a patent duly issued by the Patent Office. From this flows a presumption of validity, a presumption which is perhaps too often minimized in the courts. Indeed, since the passage of the 1952 Act, 35 U.S.C.A. § 1 et seq., we have had occasion to comment on the fact that restrictive judicial views of inventiveness developed in cases where duly issued patents were declared invalid departed from the more liberal standards pertaining at a prior time and forced a Congressional reinvigoration of the standards. Lyon v. Bausch & Lomb Optical Co., 224 F.2d 530, 106 USPQ 1 (2 Cir. 1955), cert. den. 350 U.S. 911, 107 USPQ 362. *Expertness and experience in passing upon patents lie primarily in the Patent Office* and these important factors are only partially offset by the greater concentration and the additional relevant evidence which can be brought to bear in any particular patent litigation in the courts. *The presumption of validity is entitled to particular weight when, as here, the file wrapper history discloses a careful consideration in the Patent Office before issue*". (Emphasis supplied.)

The court states erroneously on page 16 of the original opinion that "the teachings of Gewecke were not cited during the prosecution of the (Nossen) patent" and that the presumption of validity is therefore weakened. The fact is that "the teachings of Gewecke" *were* cited by the Patent Office Examiner in the form of U.S. Patent No. 2,127,504 to Derr of 1938, which discusses Gewecke's hydrolysis of aluminum nitrate solution, including its industrial drawbacks, with much greater clarity and more comprehensively than the three Gewecke documents. The Derr patent was overcome by Dr. Nossen's explanations. The presumption of validity is therefore strong. The strength of the presumption is not weakened by the fact that the Gewecke process was cited as a component part of a different disclosure that contains additional subject matter. In *Otto* v. *Koppers*, 246 F.2d 789 (CA 4), the court thus stated:

> "Astute and enterprising attorneys can always find references not of record in the Patent Office, but if they do not involve some substantial element in the defense of anticipation which was not considered by the Patent Office, the failure to make them record references cannot weaken the statutory presumption".

## VI. Petitioners were deprived of due process by the court's refusal to consider the merits of their motion for rehearing since the refusal was entirely based on a fictitious procedural ground.

A refusal, on procedural grounds, to consider a substantive showing that a court has wrongly decided scientific questions raised for the first time by the court in its decision, might be abuse of judicial discretion under ordinary circumstances.

It is shocking and violative of due process when the refusal is made by the Court of Claims in the context of a fact pattern in which the asserted procedural ground is a fiction or, at best, spells a misunderstanding between the court and the commissioner, for which petitioners cannot be blamed. *Langnes* v. *Green*, 282 U.S. 531, 541.

The uncontroverted fact is that the court's remand order referred to "the Gewecke *publications*" only and that the commissioner therefore interpreted the remand order to exclude the Gewecke *patent*. The term "patents" and "publications" have different meanings in patent law (App. J, *infra*, 35 U.S.C. 102). The commissioner's supplemental report filed in compliance with the remand (App. F, *infra*) confirms expressly that the remand order embraced the "*two*" Gewecke publications only. The Gewecke *patent* is not mentioned in the commissioner's lengthy supplemental report.

It is thus crystal clear that the Gewecke *patent* was not before the commissioner during the remand, and to state that evidence on the Gewecke *patent* had been "invited" is

clearly contrary to the established facts. To penalize petitioners for not having adduced evidence on the Gewecke patent under these circumstances, or for not having asked for review of the commissioner's asserted refusal to hear testimony thereon, is tantamount to stating that petitioners may not prove their case because they are not bestowed with prescience. It is arbitrary and violative of due process for the court to predicate its refusal solely on a remand order, ambiguous at best and in conflict with the court's intentions when interpreted literally, where the commissioner, to whom the remand order was directed, interpreted it in the literal sense. *Foman* v. *Davis*, 371 U.S. 178; *Conley* v. *Gibson*, 355 U.S. 41, 48. It is also preposterous to suggest that petitioners, in a case involving fifty-six prior art references, could have reasonably foreseen at the time that the court, two years later, would decide the case on a chemical point not involved in the remand and not previously raised by anyone.

In essence, therefore, after more than eight years of litigation, the court below adopted a position in respect to the Gewecke patent which had not been advanced earlier, is contrary to elementary chemical knowledge and in conflict with the *Seymour* doctrine, and is totally devoid of evidentiary support. When petitioners attempted to show that the court's position was factually wrong, they were arbitrarily precluded on the ground that the showing should have been made during the earlier remand, when the issue for which the showing was required had not been involved in the remand and petitioners had in fact been prevented from making the showing. *Reid* v. *Covert*, 354 U.S. 1, 65; *Henslee* v. *Union Planters Bank*, 335 U.S. 595, 600. To be told in this case by a court that "it is unnecessary to consider whether the interpretation we arrived at, with the light we had, was correct or not" (App. B, *infra*, p. 6) is a classic example of an arbitrary disregard of due process.

The court's unconscionable conduct is aggravated when viewed in the context of this case. Petitioners have very limited means, while respondent is the world's most powerful adversary whose misguided agents vowed to make petitioners' path "thorny" (Tr 11). They lived up to their promise during the protracted proceedings by engaging in conduct ranging from deliberate falsehoods (PX 39L, Tr 216-217) through harassment by the FBI (Tr 9) to attempts to overpower petitioners and to flood the proceedings by sheer bulk.[7] It is suggested that the Court of Claims, as a court charged with the duty to dispense justice between citizens and government, utterly failed to discharge its mandate and that the court's conduct certainly was not compatible with the court's avowal that "it must seek the true meaning and intent of the (Gewecke) patent". Having decided the case against petitioners on an unlitigated issue that was not within its expertness, it was the court's clear duty to show sufficient intellectual humility and openmindedness at least to listen to, if not to adopt, the views of those who possess acknowledged expertness on the point in issue, rather than to dismiss substance in favor of a procedural point that, moreover, turned out to be fictitious.

[7] Although the government had referred to fifty-six prior art references before or during trial, it attempted to introduce twenty-eight documents during the remand proceeding.

## CONCLUSION

**For these reasons, a writ of certiorari should issue to review the judgment and opinions of the United States Court of Claims.**

Respectfully submitted,

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*Of Counsel:*
JOHN J. MCGLEW
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June 10, 1970

## Certificate of Service

Three copies of the foregoing Petition for a Writ of Certiorari were served upon the Hon. Solicitor General, Department of Justice, Washington, D. C. 20530, by depositing the same in a U.S. Post Office at New York, New York, with first-class postage pre-paid, addressed as above, and

One copy of the said Petition was served upon William D. Ruckelshaus, Esq., Assistant Attorney General, Department of Justice, Washington, D. C. 20530, by depositing the same in a U.S. Post Office at New York, New York, with first-class postage pre-paid, addressed as stated,

This 10 day of June, 1970.

DAVID TOREN
Counsel for Petitioners

# APPENDIX A

## Original Court of Claims Opinion dated October 17, 1969

(PHOTOSTATS)

(See opposite ☛)

APPENDIX A

# In the United States Court of Claims

No. 350-61

(Decided October 17, 1969)

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ERNEST SAMUEL NOSSEN AND E. S. NOSSEN LABORATORIES, INC. v. THE UNITED STATES

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*David Toren*, attorney of record for plaintiffs. *McGlew and Toren* of counsel.

*Martin Avin*, with whom was *Assistant Attorney General William D. Ruckelshaus*, for defendant. *Roland A. Anderson* and *John A. Horan*, of counsel.

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Before COWEN, *Chief Judge*, LARAMORE, DURFEE, DAVIS, COLLINS, SKELTON, and NICHOLS, *Judges*.

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OPINION

NICHOLS, *Judge*, delivered the opinion of the court: *

This is a patent suit under Title 28 U.S.C. § 1498 (1964) for reasonable and entire compensation for the unauthorized use of plaintiffs' patented invention. Plaintiffs allege infringement of claims 1, 2, 4, 6, 7, 8, 9, and 12 of U.S. Patent No. 2,737,445, issued on March 6, 1956, to plaintiff Ernest Samuel Nossen for "Process for the Thermal Decomposition of Metal Nitrates." The application for patent was filed September 14, 1951. Plaintiff E. S. Nossen Laboratories, Inc. is the exclusive

*The case was tried before our former Commissioner, now Judge, Donald E. Lane, who submitted an original and a supplemental opinion, with fact findings, all of great value to us. We agree with his findings with minor modifications, and his conclusions, but we deem a new opinion necessary to deal with plaintiffs' numerous exceptions urged before us.

licensee under U.S. Patent No. 2,737,445. The parties have agreed to defer trial of any accounting issues until the issues of patent infringement and patent validity are decided.

It is determined that claims 1, 2, 4, 6, 7, 8, 9, and 12 of the patent in suit are invalid in view of the prior art.

That patent describes and claims a process for the thermal decomposition of a number of specified metal nitrates, including those of uranium and aluminum. The alleged invention resides in the discovery that nitric acid vapors are directly and substantially instantaneously formed by subjecting the defined metal nitrates to a temperature higher than their decomposition temperature in the presence of steam. Nitric acid in its liquid form is recovered from the nitric acid vapors. Practice of the invention is said by the plaintiffs to decrease the overall cost of the decomposition reaction by eliminating the need for equipment to convert nitric oxide, which is produced by prior art decomposition processes, to nitric acid. The patent disclosure and patent claims in suit are described in detail in the accompanying findings of fact.

Claim 1 of the '445 patent reads: [Indentation added.]

> 1. A process for the thermal decomposition of a metal nitrate of which the metal is selected from the electromotive series starting with magnesium towards and including the noble metals and which forms the unstable $N_2O_5$ as primary gaseous product when decomposed, into a solid product and nitric acid comprising the steps of:
>
> (a) subjecting the metal nitrate to a temperature higher than the temperature of its decomposition in the presence of a continuous flow of steam, liberating unstable $N_2O_5$ and
>
> (b) causing its reaction with said steam before it breaks down into lower nitric oxides, to form nitric acid vapors and a solid product and
>
> (c) condensing said nitric acid vapors for recovery of the nitric acid in its liquid form.

Claim 2 is similar to claim 1. In claim 2 an added gas is recited to be introduced along with the steam. In claim 4, which is dependent on claim 2, the added gas is required to be inert to nitric acid. While the process steps of claim 6 generally correspond to claim 1, claim 6 differs by reciting that an *aqueous* metal nitrate solution rather than an un-

specified form of metal nitrate is decomposed. The decomposition of the aqueous solution liberates the steam necessary for the process. Claim 7, which is dependent on claim 6, requires that the metal nitrate solution be subjected to the thermal decomposition temperature in the form of a thin film. Claim 8 recites that an added gas is present during the decomposition reaction and in other respects it corresponds to claim 6. Claim 9 depends on claim 8 and contains the additional limitation that the aqueous solution of metal nitrate is subjected to the decomposition temperature in the form of a thin film. Claim 12 is also dependent on claim 8 and requires that the added gas contain oxygen.

The nitrates may be obtained by dissolving metals or metal oxides in nitric acid. In that case the invention recovers the nitric acid for recycling. The nitrate may be used in dry form but "it may be more convenient" to use an aqueous nitrate solution. A "preferred embodiment" is to spray the solution on an internally heated rotating drum, thus forming a "thin film." The solution water "flashes off" to provide the needed steam, leaving the solid product deposited on the drum, whence it is scraped off by a properly placed knife in the course of the drum's rotation.

Plaintiffs' claims further assert that the metal nitrate breaks down in the presence of steam, at its decomposition temperature, to form $N_2O_5$ (nitrogen pentoxide), which then combines with water to produce the nitric acid, all substantially in a flash.

The alleged infringements consist of processes employed in two of defendant's Atomic Energy Commission plants to recover nitric acid from uranyl (uranium) nitrate.

The prior art relied on by defendant consists of a number of patents and other disclosures. We deem to be decisive, German Patent No. 556,882, issued to Dr. Fritz Gewecke on August 15, 1932 (defendant's exhibit 14, with English translation), and two articles by this same Dr. Gewecke, one in *Die Chemische Fabrik*, No. 21–22, pp. 199–209 (1934) (defendant's exhibit 7, and translation, 8), the other in *Chemiker-Zeitung*, No. 15, pp. 157–58 (1936) (defendant's exhibit 17, with translation).

The Gewecke patent discloses a continuous process for the decomposition of aluminum nitrate by means of heat into aluminum oxide with the substantially complete recovery of nitrogen as nitric acid alleged. In explaining the state of the art prior to his invention, Gewecke mentions problems inherent in the complete thermal decomposition at high temperatures of aluminum nitrate, including high heat losses, and loss of nitric acid in the form of nitrous gases. The Gewecke patent states that in the prior art, liquid-state decomposition reactions which were accomplished by adding water during the heating of the aluminum nitrate solution allowed a recovery of 70 percent of the nitric acid. However, the remaining 30 percent of the nitric acid was recoverable only by subjecting the reaction materials to objectionable high temperatures. On the other hand, Gewecke's patent process, so far as here pertinent, involves jet spraying of a concentrated aluminum nitrate solution upon solid particles of aluminum oxide, and heating in vacuo and/or by passing steam or gases over the mixture. Gewecke first concentrates an aluminum nitrate solution to attain a temperature of approximately 135° C. This hot solution is subsequently jet-sprayed onto agitated particles of aluminum oxide to obtain an easily handled material suitable for continuous further treatment, as claimed. The aluminum nitrate-aluminum oxide mixture may be heated in vacuo and/or by passing steam or gases over the mixture. No upper temperature for the heating step is mentioned in the German Gewecke patent. Gewecke has titled his patent "Process for the Thermal Decomposition of Aluminum Nitrate." Gewecke says the process is continuous, not "batch-wise." The low decomposition temperatures referred to as desirable by Gewecke must be read in light of his discussion of the high temperatures previously required for complete thermal decomposition. In summary, the Gewecke patent discloses the complete thermal decomposition of one of plaintiffs' claimed metal nitrates by (a) heating the metal nitrate in the form of a thin film to a temperature higher than the temperature of its decomposition, (b) in the presence of steam to obtain a solid product and substantially complete recovery of all nitric acid.

The 1934 Gewecke article, so far as here pertinent, describes groups of laboratory experiments in the "thermal

clevage" of aluminum nitrate. Nothing is there said about their being continuous and they are construed as being performed "batch-wise." One group deals with hydrolytic cleavage, *i.e.*, in an aqueous solution, at various temperatures. (Plaintiffs here say that aluminum, iron, and bismuth nitrates are subject to hydrolysis, *i.e.*, chemical decomposition in water, which is accelerated by heating the water, but that uranium and the other metals referred to in their patent are not.) As the water evaporated off, Gewecke reports, nitric acid vapors also were formed. By repeatedly diluting and rediluting the water, over a long period of time, up to 70% of the nitric acid was recoverable. Next, Gewecke heated solid aluminum nitrate cyrstals at various temperatures, producing, as before, both water vapor and nitric acid (the crystals at certain temperatures melt in the water crystallization which they contain). Reactions were speeded up and recovery better when the experiment was performed in a partial vacuum or with inert gases. The article proceeds to consider experiments in the thermal decomposition of ferric nitrate, and concludes with the statement, apparently applicable to the dry decomposition of aluminum nitrate, that with care the loss of nitric acid as nitrous gases was only 5% to 10%.

The 1936 *Chemiker-Zeitung* article attempted to demonstrate that it was possible to produce aluminum from German clay, eliminating the drain on reichmarks in the purchase of imported bauxite. The intense pace of German rearmament at that time, in preparation for World War II, and her consequential foreign exchange difficulties, are well remembered. The article described the patented "Nuvalon" process which, after preliminary steps, ending with a filtered aluminum nitrate solution, subjected this "decomposition solution" "directly, or after precipitation of aluminum nitrate crystals [*i.e.*, by two alternative methods] to evaporation and cleavage." The nitric acid was "recycled." The article footnoted the earlier one for "the details and theoretical bases."

The article further said the decomposition solution, "respectively" [alternatively?] the crystals, may be "worked up further in different ways." One way was to heat the

aluminum nitrate to 300–400° centigrade while passing steam over it, leading to direct recovery of 90% of the nitric acid. The remaining nitrous gases could be regenerated in a small installation. This looks like the dry crystal method of the 1934 article. An alternative is offered, to react the decomposition solution with alkalis such as ammonia. There is a diagramatic flow sheet which shows the filtered aluminum nitrate solution flowing into an evaporator. From there it goes into a slanted object which may be a rotary calciner. It is called a calcining oven. Out of the lower end of this oven comes the aluminum oxide or alumina. From the upper end a line goes to a reservoir where the nitric acid is held for recycling. It is possible but not certain that the diagram may potray the patent agitated bed method. It may portray the dry crystal method described in the text. It may cover both, or some other.

We now turn to the fascinating feature of this case: what plaintiffs and defendant make of these disclosures.

First, as to the 1932 patent. Defendant's expert says, and our commissioner agreed, that the process was in every essential the "thin film" technique. (Dr. Nossen himself testified that the "thin film" technique includes spraying the metal nitrate on a "fluidized" or "moving" bed of the metal oxide.) The agitation of the bed of aluminum oxide particles under a spray of aluminum nitrate solution serves, apparently, to coat the particles with the solution, the water and nitric acid flashing off, and aluminum oxide remaining behind as a solid, continuously laminating the particles of the original bed. The patent claims the process is "continuous", not batch type.

This analysis implies that the bed is continuously maintained at a temperature at or above the temperature of thermal decomposition of aluminum nitrate, say 180° C., but the patent nowhere expressly says this, an omission through which plaintiffs seek to drive a team of horses, as will appear. Plaintiffs argue in their exceptions that the hot solution is sprayed on the agitated bed while it is cold, heat from steam or otherwise being applied only after the mixture is set. Thus the agitating and spraying of themselves do not accomplish any thermal decomposition, but create an apparently unmanageable solid or doughy mass, resembling some peculi-

iarly unattractive breakfast food. There is no explanation how the thermal decomposition is then accomplished. It would seem to be made more difficult rather than easier by these patent steps, as construed by plaintiffs.

This interpretation seems not to account for Gewecke's claim that the process is continuous. It comprises of necessity, alternatively heating the bed and chilling it, a batch process, the opposite of continuous. Moreover, it imputes to the German patent office the ultimate absurdity of patenting a process to make nitric acid in which the disclosures stop short of any production of nitric acid.

In the next to last paragraph before the claim, Gewecke states that it had previously been proposed to mix the product to be calcined [*i.e.*, decomposed] "with calcined product *prior to* the heat treatment." (Emphasis supplied.) This he states is disadvantageous because of "complication of plant" due to "the necessity of operating in a batch-wise manner." In contrast to the above, his process assures an "easy and convenient continuous decomposition" in which recovery of the nitric acid is "nearly complete." Yet plaintiffs' construction of the patent reads it as disclosing a process practically the same as the former process Gewecke proposed to supersede. Since Gewecke rejects mixing and then heating as "batch-wise" he must intend in his own "continuous" process to spray, mix, and heat simultaneously, though he does not say so expressly.

While defendant's expert witnesses construed the Gewecke patent according to their position, plaintiffs offered no testimony to support their interpretation, and it must stand on the authority of plaintiffs' able counsel alone.

In reality what plaintiffs appear to be doing is to ridicule the cloudy phraseology and *lacunae* that do indeed exist in the Gewecke patent, at least in its English translation. If Dr. Gewecke were with us today, no doubt he would be thoroughly irked. But the display, brilliant as it is, gives little help to the court in seeking, as we conceive we must, the true meaning and intent of the patent. In construing a document, you cannot beat an interpretation that makes sense with one that does not. It is ambiguous only if more than one construction are all intelligible. Defendant's notion

of a continuously hot bed is more helpful to the court than plaintiffs' of an alternately hot and cold one, supposing both were possible under the literal language, because defendant postulates a concept that a member of the most brilliant scientific community in the Western world—as that of Germany was reputed to be—might conceivably have deemed it worth while to patent. Plaintiffs suggest nothing to show how their interpretation might have made any sense, in 1932 or any other time.

So far as plaintiffs' interpretation of the Gewecke patent supports a legal argument it is that this patent does not invalidate the '445 patent because it does not disclose all the elements of the patent to be invalidated in full, clear, and exact terms, as a foreign patent must do. *Badowski* v. *United States*, 135 Ct. Cl. 93, 140 F. Supp. 544, 109 U.S.P.Q. 293 (1956); *Dewey & Almy Chemical Co.* v. *Mimex Co.*, 124 F. 2d 986, 52 U.S.P.Q. 138 (2d Cir. 1942, per Learned Hand, J.); *Aluminum Co. of America* v. *Sperry Products Inc.*, 285 F. 2d 911, 127 U.S.P.Q. 394 (6th Cir. 1960). Of course, if plaintiffs construe the Gewecke patent correctly this argument would prevail, for the patent so construed discloses nothing, even in cloudy fashion, but the extravagance of plaintiffs' interpretation is the best evidence that, given a fair interpretation, the argument will fail. We think the *lacunae* and poor phraseology of the Gewecke patent (as translated) are resolved within the four corners of the instrument, and therefore it is full, clear, and non-ambiguous.

We believe and hold that the Gewecke invention, properly construed, was to spray continuously a hot (135° C.), concentrated solution of aluminum nitrate upon a hot, continuously agitated bed of aluminum oxide particles, in the presence of steam, producing a vapor of steam and nitric acid, and a solid lamination of aluminum oxide on the particles. So construed, it is quite similar to one of the allegedly infringing operations, defendant's "agitated bed" at Hanford, Washington.

The process of imputing folly to Gewecke continues in plaintiffs' analysis of the 1934 article. His description of a series of discontinuous laboratory experiments in "batch" or "pot" decomposition becomes, in plaintiffs' briefs, a single

sequential industrial operation, though clearly Gewecke prefers for industry a continuous process. Thus, according to plaintiffs, Gewecke insists on extracting the last possible smidgen of nitric acid by hydrolysis from his solution of aluminum nitrate, although by so doing he leaves himself with a dry residue of "basic aluminum nitrate", a "degraded product" not capable of releasing nitrogen pentoxide and capable of thermal decomposition only by intense heat in the 300–400° C. range, as against 180° C., the thermal decomposition temperature of the original aluminum nitrate. Per plaintiffs, evidently Dr. Gewecke was a man who loved to do things the hard way. It seems clear from the 1936 article that Gewecke viewed decomposition of aluminum nitrate in solution, and in dry form, as alternates, not steps to be performed in sequence.

Plaintiffs have their own interpretation of the flow sheet above mentioned, which illustrates the 1936 article (exhibit 17). According to them the evaporator there shown is the place where most of the nitric acid is extracted by hydrolysis, with solid basic aluminum nitrate remaining, to be decomposed by intense heat in the calcining oven. But if this were so there should be a line from the evaporator to the recycling reservoir, to show where the nitric acid comes from. In fact, the only such line runs from the calcining oven to the reservoir, indicating, contrary to plaintiffs' belief, the nitric acid comes principally from the calcining oven. We say "principally" because the record shows that any heating of the solution in the evaporator would produce some nitric acid. Defendant says, the evaporator is used only to concentrate the solution for spraying, per the patent, and that the "calcining oven" actually harbors an "agitated bed" used to carry out a "thin film" technique of decomposition. If the flow sheet does not affirmatively support this theory, at least it does not refute it, as it does the theory preferred by plaintiffs. Defendant's expert, Lawroski, testified the sheet showed "obviously a schematic of an application of a continuous type method for decomposing material." There is no opposing expert testimony, as to this.

Plaintiffs urge a number of advantages that one following Nossen's teaching would enjoy over one instructed by Gewecke, but in every case it appears that it is not the pri-

meval Gewecke, but Gewecke as expounded on behalf of Nossen, who labors under such crippling disadvantages:

1. *Extraneous steam.* Gewecke, when he uses steam, per plaintiffs, gets it from an "extraneous" source; Nossen, from the water that carries the metal nitrate in solution. This derives in part from the supposed fact that Gewecke's agitated bed is cold when sprayed and the solution water presumably wasted. There is nothing to show that Gewecke would not utilize any intrinsic steam he had before resorting to an extrinsic source. There is nothing in the record to show his patented operation would not generate as much intrinsic steam as Nossen's revolving drum. There is nothing in the record to show whether the burden of producing and delivering extrinsic steam would be proportionally heavy or light compared to other costs of the operation.

2. *Dilution of the acid.* Plaintiffs urge that because Gewecke would use more steam in relation to the volume of acid produced, the acid would be more diluted on condensation. This appears also to depend on plaintiffs' arbitrary assumptions as to what the Gewecke process is.

3. *Two-step process vs. one-step.* There is nothing in the record that Gewecke intended to prescribe a two-step process. To the extent he proposed to decompose by hydrolysis a second step would have been necessary to complete recovery of the nitric acid, but there is nothing to show he did more than experiment with hydrolysis to establish its disadvantages. The 1936 article shows he visualized decomposing in solution and dry as alternatives. His patented process appears just as capable as Nossen's of doing the job in a single step, so far as the record shows. The 1936 flow sheet, according to Lawroski, shows a continuous operation.

4. *Length of time required.* This argument stems from the fallacy that Gewecke's prolonged laboratory experiments were industrial processes.

5. *To what metal nitrates applicable?* Plaintiffs argue that only the three metals nitrates they say are susceptible to hydrolysis, aluminum, bismuth, and iron, can be decomposed by the Gewecke process, as against 22 by Nossen. This assumes Gewecke's process is hydrolysis. Even by plaintiffs' own labored interpretation of Gewecke's supposed two-step

process, the first only is hydrolysis. If the first step proved useless, it might occur to anyone to rely on the second for the entire job. As indicated, however, it seems more than doubtful that Gewecke, in reporting partial decomposition of a solution by hydrolysis in the laboratory, ever intended to recommend its industrial use as a first step to be followed by thermal decomposition of a water-free basic nitrate at high temperatures.

Plaintiffs' primary contentions are that the Nossen patent process requires *subjecting* a metal nitrate to its termal decomposition temperature rather than *mere heating*, and that it also requires that the metal nitrate be subjected to said temperature in the form of a *thin film*. Plaintiffs contend that the Gewecke publications teach denitration by *hydrolysis* and *chemical cleavage* by *gradual* heating. Plaintiffs' assert that the denitrations obtained by Nossen and by Gewecke are based on different chemical phenomena and produce different results.

Defendant contends that the term *subjecting* in the Nossen patent claims encompasses rapid and slow heating processes, that the *manipulative steps* of the Nossen patent process and the Gewecke processes are *fundamentally the same* even though the parties' *theoretical* explanations for the chemical reactions may differ, that the relative number of metal nitrates mentioned by the Nossen patent and by the Gewecke publications is irrelevant, that the Nossen patent process does not produce concentrated nitric acid, that defendant's process at Hanford does not infringe, and that the Nossen patent claims in suit are invalid.

The Nossen patent, to repeat, discloses and claims a *process* for the thermal decomposition of metal nitrates to recover nitric acid. The patent specification states that if a metal nitrate is heated to a temperature higher than the temperature of its decomposition and in the presence of steam, an unstable nitric acid anhydride, $N_2O_5$ (nitrogen pentoxide), is formed which combines with water to form the true acid in an exothermic reaction. It states that decomposition of $N_2O_5$ can be slowed down by having a high amount of oxygen present and that the nitric acid must be removed from the reaction zone to avoid its decomposition under the influence

of too high a temperature. The patent specification further states that the nitric acid is recovered from the gaseous reaction products by condensation. The Nossen specification discloses that it is convenient to use aqueous metal nitrate solutions and that a sufficient quantity of water is present by continuously introducing fresh metal nitrate solution so that the reaction takes place in a thin film of material. The patent specification further states that a gas containing oxygen may be present, or an inert gas such as nitrogen or steam may be used. The Nossen patent specification suggests that the patented process may be carried out in a unit comprising a housing enclosing an internally heated rotatable drum on which the reaction takes place, the housing having an aperture and pipe for conducting gases containing nitric acid vapors to a condenser and having an aperture for the discharge of solid material and for the inlet of steam, gas and/or air. The specification states that the drum is heated to a temperature at least as high as or higher than the decomposition temperature of the metal nitrate to be decomposed. However, no equipment is illustrated in the Nossen patent and all of the Nossen patent claims are directed to processes only.

The Nossen patent specification discloses that the decomposition process may be used with all metal nitrates which in their anhydrous state develop nitrogen dioxide ($NO_2$ and/or $N_2O_4$) when heated and that the decomposition temperatures vary from 60° to 600° C., depending on the nitrate treated. The specification identifies 22 metals whose nitrates it states may be decomposed. Example I in the Nossen patent specification discloses the decomposition of aluminum nitrate solution at 190° C., and states that the same method is applicable to ferric, zinc, cobalt, nickel, chromium, manganese, and bismuth nitrate solutions at stated temperature ranges. Example II discloses the decomposition of lead nitrate in an externally heated tube with a temperature control and an attached condenser, and a first container and a second container, and states that this method is also applicable to mercuric and cadmium nitrates.

Gewecke's 1934 article (as translated) says that to achieve thermal cleavage of aluminum nitrate, it may be *subjected* to

thermal decomposition. The 1936 article (as translated) says that the decomposition solution is *subjected* to evaporation and cleavage. These are Government translations, but plaintiffs' attorney, who is fluent in German, accepts them as accurate, with one correction at p. 743 of the record, which we accept. Thus the use of the word "subjecting" in Nossen's claim fails to carry the load so far as it is relied on to show a patentable difference between Nossen's processes and Gewecke's. There is nothing to show that the gradual increases of temperatures in Gewecke's experiments were recommended by him as an industrial process. Rather he seems to contemplate use of saturated or superheated steam or gases at temperatures continuously in the 300°–400° C. range. He does not declare anywhere that he derives any advantage from the instantaneous passage of the nitrate through intermediate temperatures. On the other hand, Nossen's claims and examples include decomposition of nitrates in crystal form, as well as in solution, and in the former case he indicates no method for any instantaneous heating to the decomposition temperature. Plaintiffs in their original requests for findings of fact in this case asserted that the Nossen patent claims in suit do not contain any limitation as to the rapidity of the heating of the metal nitrate to above its decomposition temperature. Similarities between the respective procedures taught by the Nossen patent and the Gewecke publications exist in respect to the decomposition of water solutions of aluminum nitrate and water solutions of ferric nitrate since the Gewecke disclosures do not mention the other metal nitrates. Both Nossen and Gewecke (1) use the same solutions as starting materials, (2) heat the solutions and any intermediately formed products in the presence of steam to a temperature which is at least as high as the thermal decomposition temperature of the respective metal nitrate contained in the solution, (3) obtain substantially quantitative recovery of the nitrate in the form of nitric acid, and (4) obtain the corresponding metal oxide as a solid.

A difference between the respective disclosures of the Nossen patent and the Gewecke publications is that the Nossen patent states that the nitrates of 20 metals in addition to aluminum and iron can be denitrated according to the Nossen process.

Whether or not an unstable nitric acid anhydride $N_2O_5$ (nitrogen pentoxide) is actually formed during the thermal decomposition of metal nitrates is not shown by the record and is merely a theoretical explanation advanced by plaintiffs as to what may take place during the decomposition process. Both sides tried experimentally to extract the nitrogen pentoxide or detect its presence, and both failed to do so. Plaintiffs contend that *subjecting* the metal nitrate solution to a temperature of the dissolved metal nitrate is the *crux* of the Nossen process because such subjection prevents any physical or chemical change of the starting material at an intermediate temperature, such as premature evaporation of water or hydrolytic reaction of water with the nitrate and renders the reactions recited in the patent claims possible. The plaintiffs' contention that there is a difference between heating and subjecting to a temperature is based on their argument that subjecting necessarily means exposing without going through intermediate temperatures. Plaintiffs contend that hydrolysis takes place even in the heating of dry crystals because at certain temperatures the nitrate dissolves in its water of crystallization. Consequences flow from this hydrolysis that plaintiffs say they avoid. When a particular metal nitrate solution is gradually heated up to a temperature higher than the thermal decomposition temperature of the dissolved metal nitrate, the heating may result in the formation of intermediate compounds at intermediate temperatures during the heating. If the heating is substantially instantaneous, some intermediate compounds may not be formed. However, the plaintiffs agree that the Nossen patent process and the Gewecke process both obtain substantially quantitative recovery of the nitrate in the form of nitric acid, the object of both processes. If instantaneous heating to a temperature higher than the thermal decomposition temperature of the dissolved metal nitrate was the real *crux* of the Nossen invention, it was not disclosed and not mentioned in the Nossen patent specification. It would not be proper for this court to read into the Nossen patent specification and patent claims a limitation or an interpretation not clearly disclosed therein.

The Nossen patent claims in suit define a process of several manipulative steps. The Gewecke publication disclosed a proc-

ess which includes the same manipulative steps. The Nossen patent claims define a process for the thermal decomposition of aluminum, ferric, or other metal nitrates. The Nossen process claimed is not different for the other metal nitrates. A reference anticipates a claim of a patent if the reference contains adequate directions for the practice of the invention claimed. See *Dewey & Almy Chemical Co.* v. *Mimex Co.*, *supra*. In construing the process claims in suit and the references, it is an identity of manipulative operations which leads to a finding of anticipation. It is settled that the scientific explanation for an invention is unimportant in considering its patentability. *De Forest Radio Co.* v. *General Electric Co.*, 283 U.S. 664, 686, 9 U.S.P.Q. 297 (1931). More specifically, in order to anticipate a claimed process, a reference need not disclose the scientific effects which are inherent in the process. See *Templeton Patents, Ltd.* v. *J. R. Simplot Co.*, 336 F. 2d 261, 142 U.S.P.Q. 428 (9th Cir. 1964). Applying the above principles, it is concluded that the recitations in the patent claims of the formation of nitrogen pentoxide and its reaction with steam, intermediate results inherently obtained by decomposing a metal nitrate in the presence of steam, do not patentably distinguish these claims from the subject matter disclosed by Gewecke. This recitation of the formation of nitrogen pentoxide and its reaction with steam is the only novel teaching in the '445 patent in suit.

Claims 1 and 6 are anticipated by all three Gewecke references each of which clearly teaches the heating of an aqueous metal nitrate to above its decomposition temperature in the presence of steam. Claim 7, which cites a thin film of metal nitrate, is anticipated by the Gewecke patent and possibly also by the *Chemiker-Zeitung* article. Claims 2, 4, 8, and 12 are anticipated by the *Die Chemische Fabrik* article which discloses the presence of steam and an added gas as recited in these claims. The remaining claim 9 recites both the thin film and added gas features. Under the standards set forth by the Supreme Court in *Graham* v. *John Deere Co.*, 383 U.S. 1, 17, 148 U.S.P.Q. 459, 467 (1966), this claimed subject matter is obvious in view of the above-mentioned prior art disclosures of Gewecke, and therefore is invalid under 35 U.S.C. § 103 (1964).

In holding the claims invalid, we do not ignore the statutory presumption of validity to be given an issued patent. This presumption is weakened where the most pertinent prior art was not considered by the Patent Office. See *e.g.*, *Chemical Construction Corp.* v. *Jones & Laughlin Steel Corp.*, 311 F. 2d 367, 136 U.S.P.Q. 150, 154 (3d Cir. 1962); *Audio Devices, Inc.* v. *Armour Research Foundation*, 293 F. 2d 102, 130 U.S.P.Q. 323 (2d Cir. 1961). The teachings of Gewecke were not cited during the prosecution of the '445 patent application. Gewecke's contributions to the nitrate decomposition art are clearly pertinent to the subject matters recited in the Nossen patent claims in suit.

The defendant has attempted to introduce in evidence four documents once classified, now declassified, to show an invalidating prior knowledge or use under the provisions of Title 35 U.S.C. § 102(a) (1964). These documents were marked defendant's exhibits 19, 20, 21, and 22 for identification, but were excluded as evidence during the trial. The defendant contended that in conformity with Section 155 of the Atomic Energy Act of 1954, 68 Stat. 947, 42 U.S.C. § 2185 (1964), these documents should have been entered in evidence. This section reads as follows:

> Sec. 155. *Prior Art.*—In connection with applications for patents covered by this Chapter, the fact that the invention or discovery was known or used before shall be a bar to the patenting of such invention or discovery even though such prior knowledge or use was under secrecy within the atomic energy program of the United States.

Defendant has not briefed or argued the point before us and is deemed to have abandoned it. So also with its point that the '445 patent claims are indefinite and ambiguous.

The record contains evidence to show anticipation in a number of patents and disclosures other than Gewecke's. They are described or summarized in the findings of fact. It is unnecessary to consider them in this opinion because we hold that Gewecke's disclosures are decisive.

In summary, it is found that claims 1, 2, 4, 6, 7, 8, 9, and 12 of the U.S. Patent No. 2,737,445 are invalid for failing to define statutorily patentable inventions thereby relieving defendant from liability for use of the process of the claims.

Since all the patent claims in suit are invalid, it is not necessary to consider infringement issues. See *John Hays Smith* v. *United States*, 136 Ct. Cl. 487, 145 F. Supp. 396, 111 U.S. P.Q. 135 (1956). Plaintiffs are not entitled to recover and the petition is dismissed.

FINDINGS OF FACT

The court, having considered the evidence, the report of Trial Commissioner Donald E. Lane, and the briefs and argument of counsel, makes findings of fact as follows:

1. This is a patent suit arising under 28 U.S.C. § 1498 for reasonable and entire compensation for the unauthorized use by or for the United States of the process disclosed and claimed in claims 1, 2, 4, 6, 7, 8, 9, and 12 of U.S. Letters Patent No. 2,737,445 issued on March 6, 1956, to Ernest Samuel Nossen, one of the plaintiffs in this suit, for "Process for the Thermal Decomposition of Metal Nitrates."

2. Plaintiff Ernest Samuel Nossen is the sole owner of the legal title to Letters Patent 2,737,445. Plaintiff E. S. Nossen Laboratories, Inc., the exclusive licensee under United States Letters Patent No. 2,737,445, is a corporation organized under the laws of the State of Delaware and having its principal place of business in Paterson, New Jersey.

3. The parties agreed at pretrial to defer the trial of any accounting issues until after a ruling by the court on liability.

4. The defendant filed a motion for summary judgment based on the difference in scope between the plaintiffs' corresponding British and United States patents. The motion was denied without prejudice and without oral argument by the court on October 30, 1964. The defendant has not relied upon this contention at the trial. The plaintiffs' corresponding British patent has not been considered in making these findings.

5. The patent in suit discloses a process for the thermal decomposition of selected metal nitrates to form metal oxides and to recover nitric acid. More specifically, nitric acid vapors are taught to be directly formed by subjecting the selected metal nitrates to a temperature higher than their respective decomposition temperatures in the presence of steam. This direct formation of nitric acid is taught to advantageously eliminate the need for converting the nitro-

gen-containing products of prior thermal decomposition processes into nitric acid. The patentee teaches that the steam necessary for the reaction may come from (a) an external source, for instance, steam introduced into a decomposition reactor containing an anhydrous metal nitrate; or (b) steam evolved from a water-containing source located in the decomposition reactor.

6. The specification of the '445 patent describes the chemical reaction mechanisms involved in the process as follows:

> Hereinafter the symbol "M" is used to broadly indicate a metal.
>
> If $NMO_3$ (a metal nitrate) is heated above the temperature of decomposition in the presence of steam, the following reactions take place:
>
> (1) $$2MNO_3 \rightarrow M_2O + N_2O_5$$
>
> (2) $$N_2O_5 + H_2O \rightarrow 2HNO_3$$
>
> In said equations $N_2O_5$ represents nitric acid anhydride being unstable as such and having, like all of the anhydrides, the tendency to combine with water to form the true acid in an exothermic reaction. If no water is present, the nitric acid anhydride $N_2O_5$ is rapidly decomposed into $N_2O_4$ and O according to the reaction.
>
> (3) $$N_2O_5 \rightarrow N_2O_4 + O$$
>
> Then, $N_2O_4$ is dissociated into $2NO_2$, the extent of dissociation depending on the temperature. However, this reaction can be slowed down by a high amount of oxygen present in the gas atmosphere bringing the equilibrium to the left side and protecting the $N_2O_5$, until it combines with water according to Reaction 2. A sufficient amount of water has to be present to form the nitric acid $HNO_3$ and to protect same against splitting. The nitric acid must be removed from the reaction zone as fast as possible so as to prevent Reaction 2 from going to the left side under the influence of too high a temperature. This feature may be obtained by subjecting the gaseous products to a sucking action or by adding a gas, preferably a gas containing oxygen, such as air, or by using an excess of steam. The nitric acid is recovered from the gaseous reaction products by condensation.

7. The '445 patent defines selected metal nitrates which may be decomposed by the process. In the specification, the process is taught to be applicable to uranium nitrate, the metal nitrate involved in the defendant's alleged infringing

acts. Other nitrates which the specification teaches may be decomposed by the patented process include aluminum nitrate, bismuth nitrate, and iron nitrate. The defendant relies on prior art showing the decomposition of the three above-listed nitrates in alleging invalidity. Uranium, aluminum, bismuth, and iron nitrates all fall within the electromotive series boundaries set forth in the patent claims in suit.

8. The plaintiffs have asserted infringement of claims 1, 2, 4, 6, 7, 8, 9, and 12 of the patent in suit. Claim 1 is the broadest of the asserted claims and covers the decomposition of both anhydrous metal nitrates and metal nitrate solutions. Claim 1 is set forth below in lettered clauses to facilitate recognition of the process conditions recited.

*Claim 1 of '445 Patent*

1. A process for the thermal decomposition of a metal nitrate of which the metal is selected from the electromotive series starting with magnesium towards and including the noble metals and which forms the unstable $N_2O_5$ as primary gaseous product when decomposed, into a solid product and nitric acid comprising the steps of:
(a) subjecting the metal nitrate to a temperature higher than the temperature of its decomposition in the presence of a continuous flow of steam, liberating unstable $N_2O_5$ and
(b) causing its reaction with said steam before it breaks down into lower nitric oxides, to form nitric acid vapors and a solid product and
(c) condensing said nitric acid vapors for recovery of the nitric acid in its liquid form.

9. Claim 2 is similar to claim 1. In claim 2 an added gas is recited to be introduced along with the steam. In claim 4, which is dependent on claim 2, the added gas is required to be inert to nitric acid. While the process steps of claim 6 generally correspond to claim 1, claim 6 differs by reciting that an *aqueous* metal nitrate solution rather than an unspecified form of metal nitrate is decomposed. The decomposition of the aqueous solution liberates the steam necessary for the process. Claim 7, which is dependent on claim 6, requires that the metal nitrate solution be subjected to the thermal decomposition temperature in the form of a thin film. Claim 8 recites that an added gas is present during the decomposi-

tion reaction and in other respects it corresponds to claim 6. Claim 9 depends on claim 8 and contains the additional limitation that the aqueous solution of metal nitrate is subjected to the decomposition temperature in the form of a thin film. Claim 12 is also dependent on claim 8 and requires that the added gas contain oxygen.

10. The steps recited in patent claim 1, which is a representative claim, are reproduced in lettered paragraphs in finding 8. Step (a), which may be described as a heating step, is partially expressed as a procedure for performing a specified function. Step (b), which may be described as a reaction step, is completely defined in functional language. The claims encompass both continuous and batch operations.

11. With regard to the heating step (a), the patent specification contains no teachings as to the necessity of a particular rate of heating. Further, there is no disclosure in the specification as to critical conditions necessary for liberating nitrogen pentoxide, but the heating step, when read in conjunction with the preamble to the claims, does require that the metal nitrate be heated above its decomposition temperature.

12. The reaction step (b) has been accurately described by plaintiffs as a corollary of the heating step. That is, the reaction producing nitric acid vapors is a natural result of the presence together of steam and the nitrogen pentoxide produced by the heating step. The reaction step does modify the heating step by specifying that the reaction is conducted under conditions which prevent breakdown of nitrogen pentoxide, $N_2O_5$, into lower nitric oxides. It is found that the reaction step is not a manipulative step and does not create a claim feature which by itself, that is, without reference to the specification, distinguishes the claims over the art. It does, however, tend to make the claims more definite. The condensation of nitric acid vapors is a conventional method for recovering these vapors.

13. The '445 patent states that it is a continuation-in-part of two patent applications, U.S. patent application Serial No. 92,079, filed May 7, 1949, which issued as Patent No. 2,681,268, dated June 15, 1954, for a "Process for the Manufacture of Manganese Dioxide and Depolarizers for Electric Cells," and U.S. patent application Serial No. 199,181, filed

December 5, 1950, for "Separation of Manganese from Iron and other Undesirable Ore Components." The '268 patent application as filed and as issued does not teach or fairly suggest the reaction of nitrogen pentoxide and steam, the reaction which is positively recited in all of the '445 patent claims in suit. The parent '268 patent teaches only the decomposition of manganese nitrate while the claims of the '445 patent in suit cover a large number of other metal nitrates. The plaintiffs in this suit cannot rely upon the earlier filing date of the '268 application. The plaintiffs' application Serial No. 199,181 was not introduced in evidence. The plaintiffs, for the purpose of this litigation, can rely on only the filing date of the '445 patent, September 14, 1951, for date of the claimed invention.

**14.** During the prosecution of the '445 patent, Nossen characterized the prior art references applied by the Patent Office as teaching a hydrolysis reaction and the subsequent distillation of nitric acid. Hydrolysis as applied to metal nitrates involves a reaction between water molecules and ions of the metal nitrates. Hydrolysis of metal nitrate solutions results in the formation of nitric acid and a basic metal salt. A hydrolysis reaction is detectable because the reaction results in an acidic solution. The Patent Office allowed the claims after Nossen pointed out the difference between his thermal decomposition and hydrolysis.

**15.** All the asserted patent claims were amended during prosecution before the Patent Office to include language reciting liberation of unstable nitrogen pentoxide and its reaction with steam before breakdown into lower nitric oxides. These amendments did not add to, but rather modified, the manipulative operations already recited in the claims. Specifically, the liberation of nitrogen pentoxide is recited as a natural result of heating one of the metal nitrates encompassed by the claims to a temperature above its decomposition temperature. The recitation, "causing its [$N_2O_5$] reaction with steam before it [$N_2O_5$] breaks down into lower nitric oxides," is an attempt to incorporate into the claims the process modifications found in the specification and reproduced in finding 6.

**16.** Defendant contends that the claims asserted by the plaintiffs, claims 1, 2, 4, 6, 7, 8, 9, and 12 of the '445 patent,

are invalid for the reason that the inventions recited therein are unpatentable in view of the art that existed at the time the inventions were made. In support of its contention the defendant has directed attention to the following prior art which was published or patented more than 1 year prior to the effective filing date, September 14, 1951, of the '445 patent.

*U.S. Patents*

| | | |
|---|---|---|
| Halvorsen | 1,652,119 | 1927 |
| Blackmore | 982,466 | 1911 |
| Six | 2,344,004 | 1944 |

*Foreign Patents*

| | | | |
|---|---|---|---|
| Gewecke | German | 556,882 | 1932 |
| Wischin | British | 1,524 | 1890 |
| Buchner | German | 556,140 | 1932 |

*Publications*

Gewecke—Die Chemische Fabrik, No. 21–22, pp. 199–209 (1934).
Blanc—Transactions of the Institution of Chemical Engineers, vol. 9, pp. 56–60 (1931).
Gewecke—Chemiker-Zeitung, No. 15, pp. 157–158 (1936).
Yvon—Comptes Rendus, vol. 84, pp. 1161–1164 (1877).
Spiegel et al.—Berichte, vol. 59B, pp. 202–204 (1926).

**17.** The German Gewecke patent discloses a process for the continuous decomposition of aluminum nitrate by means of heat into aluminum oxide with the substantially complete recovery of nitrogen as nitric acid. In explaining the state of the art prior to his invention, Gewecke mentions problems inherent in the complete thermal decomposition at high temperatures of aluminum nitrate including high heat losses, and loss of nitric acid in the form of nitrous gases. The Gewecke patent states that in the prior art, liquid-state decomposition reactions which were accomplished by adding water during the heating of the aluminum nitrate solution allowed a recovery of 70 percent of the nitric acid. However, the remaining 30 percent of the nitric acid was recoverable only by subjecting the reaction materials to objectionable high temperatures. On the other hand, Gewecke's patent process, which is here pertinent, involves the mixing through jet spraying of a concentrated aluminum nitrate solution with solid particles of aluminum oxide and heating in vacuo and/or by passing steam or gases over the mixture. Gewecke first concentrates

an aluminum nitrate solution to attain a temperature of approximately 135° C. This hot solution is subsequently jet-sprayed onto the particles of aluminum oxide to obtain an easily handled material suitable for continuous further treatment. The aluminum nitrate solution forms the equivalent of a thin film on the aluminum oxide particles. The aluminum nitrate-aluminum oxide mixture may be heated in vacuo and/or by passing steam or gases over the mixture. No upper temperature for the heating step is mentioned in the German Gewecke patent. Gewecke has titled his patent "Process for the Thermal Decomposition of Aluminum Nitrate." The low decomposition temperatures referred to as desirable by Gewecke must be read in light of his discussion of the high temperatures previously required for complete thermal decomposition. Gewecke contrasts his process with former art which mixed the nitrate with the oxide *prior to* the heat treatment, necessitating a batch process. In summary, the Gewecke patent discloses the complete thermal decomposition of one of plaintiffs' claimed metal nitrates by (a) heating the metal nitrate in the form of a thin film to a temperature higher than the temperature of its decomposition, (b) in the presence of steam to obtain a solid product and substantially complete recovery of all nitric acid. The Gewecke patent discloses the manipulative steps recited in claims 1, 6, and 7 and teaches that the same result is obtained.

**18.** The 1936 article by Gewecke in *Chemiker-Zeitung* incorporates by specific reference the teachings found in the 1934 article by the same author in *Die Chemische Fabrik*, and discloses the continuous decomposition of a thin film of aluminum nitrate solution in a rotary calciner to form aluminum oxide and nitric acid by heating to 300°–400° C. while passing steam over the solution. The direct recovery of 90 percent or more of the nitric acid is taught. This 1936 article by Gewecke teaches all the manipulative steps recited in claims 1, 6, and 7 and teaches that the same result is obtained.

**19.** The 1934 article by Gewecke published in *Die Chemische Fabrik* relates to decomposition of aluminum nitrate and ferric nitrate. Tables 14 and 15 show that at temperatures above 190° C. significant amounts of water are emitted from the decomposition of aluminum nitrate. Significantly, inert gases, or gases which enhance the decomposition reac-

tion including air, are taught to increase the direct recovery of nitric acid during thermal decomposition. By supplying air and water vapor to the reaction, over 90 percent of the nitric acid present in the nitrate is taught to be directly recoverable. This 1934 publication discloses the requirements of the '445 patent claims 2, 4, 8, and 12 and anticipates these claims which recite an added gas.

20. Claim 9 of the '445 patent which recites that the metal nitrate be in the form of a thin film and also that an added gas be present during the reaction, is not anticipated by any one of the Gewecke references for the reason that no single Gewecke reference recites both of these process conditions. The Gewecke 1934 article, discussed in finding 19, teaches the supply of an added gas during the decomposition reaction, while the Gewecke patent discloses forming a thin film of a metal nitrate prior to decomposition. A combination of these two disclosures teaches all the acts recited in claim 9 of the '445 patent.

21. The preferred reaction conditions disclosed in the '445 patent specification for driving the patentee's nitric-acid-producing reaction (reaction 2 as set forth in finding 6) towards 100-percent conversion to nitric acid, correspond to the reaction conditions taught in the Gewecke disclosures. The only equilibrium-driving force disclosed in the '445 specification and not explicitly disclosed by Gewecke is the use of a high amount of oxygen present in the gas atmosphere to repress the following reaction:

$$N_2O_5 \rightarrow N_2O_4 + O$$

Gewecke, in the 1936 *Die Chemische Fabrik* article, discloses that supplying air and water vapor to the reaction allows the recovery of over 90 percent of the nitric acid theoretically recoverable. In Example I of the '445 patent, which is the only example in the patent wherein any oxygen is supplied to the reaction, air which contains oxygen is supplied to the reaction. The patent specification contains no other guide to what a "high amount" of oxygen comprises. It is found that the specification of the '445 patent does not contain novel teachings relating to desirable reaction conditions for thermally decomposing metal nitrates.

22. Blackmore patent 982,466 is specifically directed to the decomposition of barium nitrate which is a metal nitrate outside the scope of plaintiffs' claims. Blackmore discloses that the nitrates of other metals which will form a metal peroxide may also be decomposed by his process including the nitrates of lead and mercury. This prior patent was cited by the Patent Office during the prosecution of Nossen's patent application and overcome by an affidavit and by remarks citing authorities showing that nitrates of lead and mercury will not form peroxides. The defendant has not presented evidence to show that the patent examiner's withdrawal of a rejection based on Blackmore was incorrect.

23. Wischin British patent 1524 of 1890 teaches the decomposition of nitrates of manganese in the presence of steam with the subsequent recovery of nitrous acid and peroxide of manganese. The defendant alleges that the addition of air is an obvious modification and that if air was added to the process of Wischin, nitric acid would be directly formed. This allegation is based on a hindsight view of the art which necessarily incorporates the teachings of the patent in suit. It is found that the early Wischin patent does not tend to make obvious the process of the claims here in suit.

24. Four declassified documents, defendant's exhibits 19, 20, 21, and 22 for identification, were not admitted into evidence, but were received for identification purposes and as an offer of proof. These documents have not been used in arriving at the foregoing findings of fact relating to the invalidity of the '445 patent claims.

25. The remaining patents and publications relied upon by the defendant relate to the decomposition of aluminum, bismuth, or iron nitrates. These disclosures do not teach the presence of steam after the metal nitrate reaches its decomposition temperature. This requirement is recited in the asserted patent claims, and is clearly taught as necessary by the specification of the '445 patent in suit. These other patents and publications do not explicitly teach the methods recited by the claims in suit which are effectively restricted to methods wherein steam is present in the surrounding atmosphere immediately after the metal nitrate is decomposed. However, the processes described in these patents and publications inherently follow the process of the asserted claims.

if there is an appreciable amount of water present in the metal nitrate material when it is thermally decomposed. The presence or absence of water in the metal nitrates at the time of decomposition by the prior art processes depends on the heating procedure employed. The heating conditions described in defendant's exhibits 15, 16, 26, 27, 28, and 29 are not sufficiently definite to categorically state that a significant quantity of steam would be present after thermal decomposition occurs. These prior art disclosures are too ambiguous to anticipate or make obvious the several patent claims in suit.

26. The defendant contends the claims are invalid for failure to particularly point out and distinctly claim the subject matter of the invention as required by 35 U.S.C. § 112. To support this contention the defendant has shown that there is no method presently known for detecting the presence of nitrogen pentoxide at temperatures above the decomposition temperatures of metal nitrates. The absence of a technique for detecting nitrogen pentoxide, an intermediate product of the claimed process, does not render the claims indefinite. The precision used in defining the manipulative heating and condensing steps is the valid basis for determining whether the claims point out the invention. It is found that the positive steps to be performed, heating the metal nitrate in the presence of steam and condensing nitric acid vapors, are defined in language which creates an ascertainable scope of coverage for the claims. Plaintiffs' broadest patent claims are anticipated by a process wherein one of the claimed metal nitrate solutions is heated to above its decomposition temperature in the presence of steam to prevent formation of lower nitric oxides. The functional recital in the asserted claims of the liberation of nitrogen pentoxide and its subsequent reaction with steam tends to make the claims more definite than they were in their originally filed form because the desirable quantity of steam present in the reaction zone becomes obvious to one skilled in the art. The patent claims in suit satisfy the requirements of 35 U.S.C. § 112.

27. The plaintiffs allege that the defendant infringes the '445 patent claims in issue by continuously denitrating uranium nitrate hexahydrate at its plant in Hanford, Washington, and at a plant of Mallinckrodt Chemical Works at

Weldon Spring, Missouri. Batch decomposition of uranyl nitrates as practiced on a production scale at Weldon Spring is conceded by the plaintiffs to be outside the scope of the claims. The defendant at Hanford, Washington, decomposes molten uranyl nitrate hexahydrate by heating the metal nitrate to a temperature above the decomposition temperature of the nitrate in the presence of steam and an added gas. Plaintiffs' exhibit 3 shows that 53–61 percent of the nitrogen emitted from the defendant's calciner at Hanford is present as nitric acid and is subsequently condensed. The defendant's continuous decomposition process as practiced at Hanford responds to the asserted claims if the reaction theory relative to the formation of nitrogen pentoxide as an intermediate is ignored. Conflicting evidence has been presented as to the reaction mechanism involved in the continuous decomposition of uranyl nitrate solution at Hanford. In the continuous decomposition of uranyl nitrates, the evidence showing formation of nitrogen pentoxide and reaction of nitrogen pentoxide with steam is more convincing than the evidence introduced by the defendant in support of its hydrolysis theory for uranyl nitrate decomposition. It is found that *if* claims 1, 2, 4, 6, 7, 8, 9, and 12 of the '445 patent are found valid, they were infringed by the defendant's operations at Hanford, Washington.

28. *Subjecting* the metal nitrate to a temperature higher than the temperature of its decomposition, as recited in the Nossen patent claims in suit, encompasses both slow and rapid heating processes. The Nossen patent and its file wrapper contents do not define the term *subjecting* nor do they disclose any specific rate of heating. On March 15, 1966, plaintiffs requested the commissioner to make a finding of fact reading as follows:

> [26.] The claims do not contain any limitations as to the rapidity of the heating of the metal nitrate to above its decomposition temperature. Whether the metal nitrate is heated slowly or rapidly is of no consequence as long as steam is present when the metal nitrate has reached and exceeded its decomposition temperature. For example, the terms of claim 1 are met when a solid metal nitrate is slowly or rapidly heated to the required temperature and extraneous steam is introduced into the reactor at a time when the metal nitrate has reached its

decomposition temperature. The claims, moreover, embrace a procedure in which an aqueous metal nitrate is first slowly or rapidly heated to dryness, whereafter the heating is continued to reach the decomposition temperature of the dry metal nitrate under introduction of extraneous steam. However, when an aqueous metal nitrate solution is to be decomposed according to the process in suit, it is usually most economical very rapidly to heat the solution to above its decomposition temperature so that the steam which is evolved from the water of the solution is still present within the system and thus available for instantaneous reaction with the transiently formed $N_2O_5$. In this manner, introduction of extraneous steam is usually not necessary.

## Conclusion of Law

Upon the foregoing findings of fact, which are made a part of the judgment herein, the court concludes as a matter of law that claims 1, 2, 4, 6, 7, 8, 9, and 12 of patent 2,737,445 are invalid and that plaintiffs are not entitled to recover, and judgment is entered to that effect and plaintiffs' petition is dismissed.

# APPENDIX B

## Court of Claims Opinion on Motion for Rehearing dated March 20, 1970

(PHOTOSTATS)

(See opposite ☞ )

APPENDIX B

# In the United States Court of Claims

No. 350-61

(Decided March 20, 1970)

ERNEST SAMUEL NOSSEN AND E. S. NOSSEN LABORATORIES, INC. v. THE UNITED STATES

*David Toren*, attorney of record for plaintiffs. *McGlew and Toren*, of counsel.

*Martin Avin*, with whom was *Assistant Attorney General William D. Ruckelshaus*, for defendant. *Roland A. Anderson* and *John A. Horan*, of counsel.

Before COWEN, *Chief Judge*, LARAMORE, DURFEE, DAVIS, COLLINS, SKELTON, and NICHOLS, *Judges*.

ON PLAINTIFFS' MOTION FOR REHEARING

PER CURIAM: Following the decision of this court, 189 Ct. Cl. 1, 416 F. 2d 1362 (1969), that the patent claims were invalid and that the suit under Title 28 U.S.C. § 1498 (1964) must be dismissed, the plaintiffs have made a timely motion for rehearing under Rule 151. The motion must be and is denied for the reasons that follow:

Our conclusion that the claims were invalid rested entirely upon anticipating disclosures by a German scientist, a Dr. Gewecke, in a patent which the German patent office issued to him in 1932, No. 556,882, and in two articles Dr. Gewecke published in the German technical press in 1934 and 1936. Defendant relied on other prior art but we did not pass upon it because the Gewecke disclosures were considered decisive.

Plaintiffs now say in their motion that we misconstrued Dr. Gewecke's writings, though before us in admittedly accurate translations, and that his disclosures were different from what we thought. To determine whether plaintiffs set forth adequate grounds under Rule 151 it is necessary to go back to the original trial of the case and trace events from that point.

Defendant offered the Gewecke patent and articles in evidence in course of presenting its case after plaintiffs had rested. Defendant's expert witnesses testified what they thought Gewecke's meanings were and the nature of the processes he disclosed. The individual plaintiff, Dr. Nossen, had testified in chief, but was not asked about the Gewecke disclosures and gave no testimony on that subject. Plaintiffs' rebuttal testimony was brief and did not allude to Gewecke. Dr. Nossen did not take the stand again.

In this connection, the record shows that Dr. Nossen was a native German and that he was awarded a Ph. D., degree in chemistry in Breslau in 1929. He also studied in Berlin and Charlottenberg. He applied for a German patent as early as 1932. He was employed up to 1936 by a German company, being stationed in Berlin and Copenhagen, apparently under the same employer in both places. In 1936 he entered employment in the Netherlands and in the early 1940's Hitler deprived him of German citizenship. He was apparently in exile during World War II, and first came to the United States in 1948. He organized the plaintiff corporation in 1950. It follows that Dr. Nossen was a fellow chemist in Germany with Dr. Gewecke at the time when Gewecke was awarded his patent and at the time of the first Gewecke article.

Commissioner, now Judge, Donald E. Lane, after hearing the testimony, filed a recommended opinion and findings with the court which, respecting Gewecke, substantially foreshadowed the conclusion the court ultimately came to. The briefing and oral argument that followed before us revealed that the parties were far apart as to what Gewecke had disclosed.

By order of January 24, 1968, the court remanded the case to Commissioner Lane for further findings on the validity

of the patent in suit, and on the issue of infringement insofar as that question may depend upon the further discussion and finding on validity. The order continues as follows:

> * * * The further opinion and findings should elucidate the similarities and differences between the patent in suit and the Gewecke publications, including (but not limited to) the bearing of these similarities and differences on the plaintiffs' contentions that (a) the patent in suit does, and the Gewecke publications do not, teach the "subjection" (rather than the mere heating) of the metal nitrates to a temperature higher than their decomposition temperature, and that this difference in treatment makes a patentable difference in result, and (b) that the plaintiffs' process is applicable to a large number of metals while that of the Gewecke publications is applicable only to a few. The commissioner has leave, in his discretion and if he deems it necessary or desirable, to allow the parties to present further evidence and/or further argument, written or oral.

Commissioner Lane's subsequent supplemental opinion and findings revealed that plaintiffs moved on May 13, 1968, that no further trial sessions be had and that no further evidence be adduced. The result was that Commissioner Lane made his supplemental report without the benefit of additional evidence.

The record reflects that Dr. Nossen himself would well qualify as an expert and that he could not but possess a knowledge of the state the art of chemistry had reached in Germany in 1932, that could be matched by few other persons indeed who might be brought before this court today.

Our asserted misconstruction of the Gewecke process or processes (we do not exclude the possibility there might have been more than one) is that we stated at page 6 (slip op., 416 F. 2d at 1366), that the "agitated bed" of Gewecke was: "continuously maintained at a temperature at or above the temperature of thermal decomposition of aluminum nitrate, say 180° C." (reference is made to the description of Gewecke's processes in the original opinion, which need not be repeated here, to explain the relevance of this). Plaintiffs' counsel says that after publication of our decision he submitted to 22 scientists of his acquaintance the full text

of the Gewecke patent together with his own explanation of it and ours, without indicating which one favored his litigation position. He heard from 17, who all agreed that his interpretation was correct. Copies of their letters are attached as exhibits to the motion.

The interpretation thus unanmiously endorsed was that Gewecke's "agitated bed" was really a moving conveyor, such as a screw conveyor, which moved cold particles past a spraying station where hot aluminum nitrate solution was sprayed upon them, after which the particles went to a decomposer where the decomposition of the aluminum nitrate was consummated by heat.

This is the first time any conveyor, screw or otherwise, has been heard from in this proceeding. Without the aid of expert testimony it would be impossible for this court to determine whether the explanation is more credible than the one put forth by defendant's experts and adopted by us. Some of the responses show that it is difficult for anyone to interpret a German patent of 1932 vintage without actual knowledge of the state of the art in Germany at that time. Apparently, according to them, the Gewecke patent is an example of a style of presentation in which a great deal is left unsaid, relying on the reader's extrinsic knowledge. That is, supposedly, why he omitted to mention the conveyor. We note, however, that only one of the 17 respondents was actually a practicing chemist in Germany at the German patent date, 1932. In this respect Dr. Nossen himself appears to possess a marked advantage over counsel's pollees.

It seemed apparent to us when we entered the order, *supra*, that further inquiry as to what Gewecke meant would require further testimony by plaintiffs which, of course, defendant would have to be given an opportunity to rebut. This is what the court expected to happen and invited when making its order of remand to the commissioner, *supra*. Plaintiffs had their chance then to show, if they knew, what Gewecke meant. Plaintiffs' counsel does not even now specifically offer, in fact, anyone for the witness stand, saying that plaintiffs would make the "authors" "available for cross examination, *e.g.*, by interrogatories."

Defendant says, with much justice, as it appears to us, that plaintiffs' principal theory at all times up to the date of our decision was that Gewecke was unintelligible, absurd, or hopelessly ambiguous. Such explanations as were offered appeared to us to be meant more to ridicule Gewecke than to elucidate him. This furnishes a natural explanation why plaintiffs kept to themselves the clear and coherent explanation of Gewecke which they now tender to the court.

Under such circumstances a motion under Rule 151 cannot prevail. Only recently in *General Elec. Co.* v. *United States*, 189 Ct. Cl. —, —, 416 F. 2d 1320, 1321 (1969), the court said:

> * * * Where a new and separate issue is raised *for the first time* in the court's opinion * * * a petition for reconsideration (or other post-decision relief) addressed to that question will be approached hospitably because the parties may not have had * * * opportunity to argue or litigate the point. * * * But where a party adversely affected by the court's decision on the issue has had fair notice that the question may well be in the case, has had a fair chance to present its position, has failed to do so, and gives no sufficient excuse for its failure, a demand for post-decision relief will normally be rejected. We point out specifically that a new issue or subject can be raised by queries from the bench, and counsel should be alert to this, * * *. (Emphasis in original).

Another recent case is *Henneberger* v. *United States*, 187 Ct. Cl. 265, 407 F. 2d 1340 (1969). See also, *Kaiser Aluminum & Chem. Corp.* v. *United States*, 187 Ct. Cl. 443, 456–7, 409 F. 2d 238, 245 (1969) (concurring opinion), where the Chief Judge said for himself and 3 other judges:

> * * * * *
>
> Any court is necessarily concerned when a responsible attorney alleges that it has reached an incorrect result because of a mistaken determination of the facts of a case. However, the facts in any litigation must be decided on the basis of the evidence produced by the litigants in that particular case. It may well be that if the case were retried, the Government could present a stronger and more effective defense, but to make a litigation an open-end proposition jeopardizes the confidence which litigants can place in a court's ability to render final judgment. * * *.

Plaintiffs' efforts to explain why it reserved such important information until this motion now before us are unpersuasive, particularly in view of the fact that the court's remand specifically informed the parties that we desired more information about Gewecke's process or processes.

Defendant of course still insists that our interpretation of Gewecke was supported by all the testimony in the record and was correct. In view of the foregoing it is unnecessary to consider whether the interpretation we arrived at, with the light we had, was correct or not. It is also unnecessary to consider whether inquiries in the nature of a poll are a proper method of supporting and substantiating a motion under Rule 151. As we have indicated, we believe that plaintiffs' present theory necessarily presupposes that the court needs to be informed concerning the state of German technology in 1932. Any party believing this should properly have come forward with testimony to show what the state of that technology was. In considering the motion we have given the plaintiffs the benefit of assuming that was what they now propose to do, although it is difficult to say so with certainty. The affidavit of plaintiffs' counsel and the exhibits which are the responses of his pollees seem to operate in some kind of limbo between a demonstration of fact and a conclusion of law.

Plaintiffs' motion for rehearing is denied and the dismissal of the petition will stand.

# APPENDIX C

## Translation of Gewecke Patent as Introduced by Respondent

## DX 14

GERMAN PATENT OFFICE

Patent No. 556,882

Issued on August 15, 1932

Class 12 m, Group 6

B 133461 IV b/12 m

Date of Announcement of Granting of Patent: 28 July 1932

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Dr. Fritz Gewecke, Seelze, near Hannover

### PROCESS FOR THE THERMAL DECOMPOSITION OF ALUMINUM NITRATE

Patented in Germany from 16 Sept. 1927

The present invention relates to a process for the thermal decomposition of aluminum nitrate, i.e., to the decomposition of this salt, by means of heat, into aluminum oxide and nitric acid.

In carrying out this otherwise known reaction large amounts of basic aluminum nitrates are always obtained, as a result of the splitting off of nitric acid. These products are very difficult to handle technically, since upon thermal decomposition they swell, form skins and sticky smears which present considerable resistance to the passage of heat. In order to achieve an as complete thermal decomposition as possible, it has been necessary to resort to very high temperatures, thus to work with very high heat losses; in addition, it had to be accepted that con-

*Appendix C*

siderable amounts of the nitric acid would be obtained in the form of nitrous gases, necessarily causing a loss of nitric acid.

In order to overcome these difficulties it has been proposed that one work, as much as possible, in the liquid phase; in other words, that one obtain the mass to be decomposed in the liquid state through addition of water during the heating, and thus distil up to 70% of the nitric acid. However, according to this procedure, it was again necessary to heat to a high temperature in order to expel the remaining 30% of the nitric acid, and the latter was decomposed by these high temperatures to nitrous gases.

According to the present invention the thermal decomposition of aluminum nitrate is carried out in such a manner that the aluminum nitrate solution is mixed, through jet spraying, with agitated aluminum oxide, and the mixture is heated preferentially in vacuo and/or by passing steam or gases over it.

Thus, by means of this process the appearance of skins or sticky smears is prevented by the creation, prior to decomposition, of a solid product which preserves its properties as a solid during the entire heating process. Particularly important here is the jet spraying of the aluminum nitrate solution and the mixing with the agitated aluminum oxide in this state, since in this way it will become possible to carry out the decomposition in a continuous manner, in a technically convenient fashion.

As an example, the process is carried out by evaporating an aluminum nitrate solution until no more basic aluminum nitrate separates out, which is attained at a temperature of approximately 135°. This solution is jet sprayed while still hot and mixed with high-percentage aluminum oxide, e.g., 60% aluminum oxide or anhydrous aluminum oxide, preferentially in a 1:2 ratio.

*Appendix C*

The decomposition can and will preferentially be undertaken in vacuo and/or under the introduction of saturated or superheated steam, since in this way it will be possible to operate at particularly low temperatures and to recover practically the entire amount of the nitric acid present in the aluminum nitrate directly as nitric acid.

Instead of steam one may also pass gases over or through the mixture.

It has already been proposed that, during the performance of calcination processes, the product to be calcined be mixed with calcined product prior to the heat treatment. Applying this procedure to the thermal decomposition of aluminum nitrate, it is indeed possible to attain an improvement of the decomposition process. One must count, however, with the complication of the plant, connected with the necessity of operating in a batch-wise manner.

In contrast to the above, the process forming the object of the present invention assures an easy and convenient continuous decomposition, in which the nitric acid contained in the product to be decomposed is also nearly completely recovered as nitric acid.

PATENT CLAIM

Process for the thermal decomposition of aluminum nitrate, characterized by the fact that aluminum nitrate solution is mixed through jet spraying with agitated aluminum oxide and the mixture is preferentially heated in vacuo and/or by passing of steam or gases over the mixture.

# APPENDIX D

## Court of Claims Remand Order dated January 24, 1968

IN THE

UNITED STATES COURT OF CLAIMS

No. 350-61

ERNEST SAMUEL NOSSEN, *et al.*

v.

THE UNITED STATES

Before COWEN, Chief Judge, LARAMORE, DURFEE, DAVIS, SKELTON, and NICHOLS, Judges.

ORDER

This case comes before the court on the merits. Upon consideration thereof, together with the briefs and oral arguments of counsel,

IT IS ORDERED that the case be and the same is remanded to the trial commissioner for further discussion (in a supplemental opinion) and further findings on the validity of the patent in suit (and on the issue of infringement insofar as that question may depend upon the further discussion and findings on validity). The further opinion and findings should elucidate the similarities and differences between the patent in suit and the Gewecke publications, including (but not limited to) the bearing of these similarities and differences on the plaintiffs' contentions that

*Appendix D*

(a) the patent in suit does, and the Gewecke publications do not, teach the "subjection" (rather than the mere heating) of the metal nitrates to a temperature higher than their decomposition temperature, and that this difference in treatment makes a patentable difference in result, and (b) that the plaintiffs' process is applicable to a large number of metals while that of the Gewecke publications is applicable only to a few. The commissioner has leave, in his discretion and if he deems it necessary or desirable, to allow the parties to present further evidence and/or further argument, written or oral.

By the Court

WILSON COWEN
*Chief Judge*

# APPENDIX E

## Toren Affidavit in Support of Plaintiffs' Motion under Rule 152

IN THE

UNITED STATES COURT OF CLAIMS

No. 350-61

ERNEST SAMUEL NOSSEN, ET AL.

v.

THE UNITED STATES

### AFFIDAVIT

DAVID TOREN, being duly sworn, deposes and says:

1. I am a patent attorney and have represented plaintiffs in this action since its inception.

2. By order of January 24, 1968, the Court remanded this case to Commissioner Lane for a further opinion and findings on the patent in suit and the Gewecke publications.

3. By letter of January 26, 1968, Commissioner Lane called a pretrial conference in his office for the purpose of discussing the procedures which were to be followed in compliance with the Court's remand order of January 24, 1968. The pretrial conference took place on February 7, 1968, before the Commissioner and was attended by Messrs. Brown, Anderson, Seaton and Avin, for defendant, and myself, for plaintiffs.

*Appendix E*

4. At the beginning of the conference, Commissioner Lane asked me whether I wanted to adduce further evidence in respect to the Gewecke publications. I answered in the affirmative and stated that I intended to perform tests in respect to the procedure disclosed in the Gewecke patent and would call Dr. Nossen and perhaps one additional expert. The Commissioner interrupted me and stated that the Court's remand order of January 24, 1968 was directed to the Gewecke publications, to wit "Chemiker-Zeitung" and "Die Chemische Fabrik" and did not embrace the Gewecke patent. He therefore would not hear evidence on the Gewecke patent.

I voiced my disagreement with this interpretation and pointed out that in my briefs I had collectively referred to the Gewecke patent and the two Gewecke articles as "the Gewecke publications" and that I therefore believed that the Court, in using the term "Gewecke publications", intended to refer to the two articles *and* the patent. The Commissioner replied that he did not think so and that if the Court had intended to include the Gewecke patent in the order it would have expressly said so. Since the order was extremely broad in respect to the procedures which could be taken concerning the Gewecke publications, to wit, the two articles, the Commissioner advised that he had no intention of further broadening the scope of the order by reading into it the Gewecke patent which was not mentioned therein. The Commissioner also indicated that the Court might have referred to the Gewecke publications, as distinguished from the patent, for the good reason that the Gewecke patent had been properly offered and received in evidence while plaintiffs had challenged the admissibility of the two articles in view of the lack of prior notice before trial.

5. According to my recollection, Mr. Avin and Mr. Seaton supported Commissioner Lane's position while Mr.

*Appendix E*

Anderson and Mr. Brown did not comment. At the end of the meeting, the Commissioner repeated that he would only hear evidence in respect to the two Gewecke publications as distinguished from the Gewecke patent.

Attached hereto, as Exhibit 1, is a copy of the Commissioner's Order of February 7, 1968, reporting on the pretrial conference.

DAVID TOREN

STATE OF NEW YORK
COUNTY OF NEW YORK } ss.:

Sworn to and subscribed before me
this 10th day of April, 1970.

ESTHER K. ATLAS
Notary Public

ESTHER K. ATLAS
Notary Public, State of New York
(No. Illegible)
Qualified in New York County
Commission Expires March 30, 1971

# APPENDIX F

## First Page of Supplemental Report by the Commissioner dated October 30, 1968

(PHOTOSTAT)

(See opposite ☛ )

# In the United States Court of Claims

No. 350-61

(Filed OCT 30 1968)

ERNEST SAMUEL NOSSEN AND E. S. NOSSEN LABORATORIES, INC. v. THE UNITED STATES

SUPPLEMENTAL REPORT OF COMMISSIONER TO THE COURT*

*David Toren*, attorney of record for plaintiffs. *McGlew & Toren*, of counsel.

*Martin Avin*, with whom was *Assistant Attorney General Edwin L. Weisl, Jr.*, for defendant. *Roland A. Anderson* and *Warren Seaton*, of counsel.

## SUPPLEMENTAL OPINION

LANE, *Commissioner:* Subsequent to the oral arguments presented December 6, 1967, the court remanded this patent case to the trial commissioner for further discussion in a supplemental opinion and for further findings on the validity of the Nossen patent to elucidate the similarities of and differences between said patent and the two Gewecke publications. The Nossen patent is U.S. Patent No. 2,737,445, issued on March 6, 1956, on an application for patent filed September 14, 1951, and a copy of the patent is plaintiffs' exhibit No. 5. Patent claims 1, 2, 4, 6, 7, 8, 9, and 12 are here in suit. The two Gewecke publications are:

Gewecke—*Die Chemische Fabrik*, No. 21–22, pp. 199–209 (1934)

Gewecke—*Chemiker-Zeitung*, No. 15, pp. 157–158 (1936)

Copies of the Gewecke articles published in German language and English language translations thereof are defendant's exhibits Nos. 7, 8, and 17.

*The supplemental opinion, findings of fact, and recommended conclusions of law are submitted under the order of the court dated January 24, 1968.

# APPENDIX G

## Plaintiffs' Motion for Rehearing

IN THE

UNITED STATES COURT OF CLAIMS

No. 350-61

ERNEST SAMUEL NOSSEN and E. S. NOSSEN LABORATORIES, INC.,

Plaintiffs,

v.

THE UNITED STATES OF AMERICA,

Defendant.

PLAINTIFFS' MOTION FOR REHEARING AND ALTERATION OF THE JUDGMENT PURSUANT TO RULE 151

Upon the affidavit of David Toren and the annexed brief, plaintiffs respectfully move the Court for rehearing and alteration of the judgment entered October 17, 1969, to the effect that claims 7 and 9 of the patent in suit be found valid and infringed.

For the purpose of this motion only, plaintiffs acquiesce in the disposition of the other claims of their patent.

The Court states on page 7 of its Opinion that it is the Court's duty to seek "the true meaning and intent" of the Gewecke patent and that this patent would be ambiguous and thus fail as anticipation under the *Badowski* doctrine "if more than one construction are all intelligible".

The Toren affidavit and plaintiffs' brief demonstrate beyond reasonable doubt that plaintiffs' interpretation of the Gewecke patent, as expounded throughout these pro-

ceedings, is not only intelligible by any standard and well supported by the plain wording and expressed conditions of the patent, but is a reasonable and comprehensible reflection of the true meaning and intent of the patent.

The Toren affidavit establishes that seventeen distinguished and reputable chemists and chemical patent practioners located in six countries, who were asked to express an opinion on the Court's and plaintiffs' interpretations without identification of the source of the interpretations, *rejected* the Court's interpretation and *accepted* plaintiffs'.

The Court's rejection of plaintiffs' interpretation of the Gewecke patent as unintelligible is not based on facts but on three suppositions, to wit:

*Supposition 1.* Plaintiffs' construction of the patent "comprises of necessity alternatively heating the bed and chilling it," (page 7 of Opinion).

*Refutation*: Plaintiffs have *never* suggested that Gewecke's bed must be alternatively heated and chilled and no such contention, express or implied, appears in the record, including the briefs. Alternate chilling and heating would not only be unintelligible but indeed impossible under plaintiffs' interpretation.

*Supposition 2.* Plaintiffs' construction of the patent suggests "a batch process, the opposite of continuous" (page 7 of Opinion).

*Refutation*: The record, including the briefs, indicates that plaintiffs have always maintained and *expressis verbis* stated that the Gewecke patent process is a *continuous and not a batch process*; and

*Supposition 3.* "Plaintiffs' construction of the patent reads it as disclosing a process practically the same as the former process Gewecke proposed to supersede" (page 7 of Opinion).

*Appendix G*

*Refutation*: Plaintiffs' construction of the Gewecke patent confirms not only that the Gewecke process is vastly different from the prior art process mentioned by Gewecke but also that it is an important improvement thereover.

All three suppositions are thus contrary to the facts of the record, based on statements imputed to but not made by the plaintiffs, and are in fact the opposite of plaintiffs' actual contentions. The brief fully documents and develops these refutations.

The brief also shows beyond reasonable doubt that plaintiffs' reading of the Gewecke patent is the more intelligible one because

1. The plain wording of the patent runs counter to the Court's interpretation.

2. The German Patent Office considered the Nossen process patentable over the Gewecke patent disclosure.

3. The single Gewecke claim is solely directed to the mixing feature and the heating of the resulting mixture. It does not mention simultaneous decomposition.

4. Gewecke requires a specified mixing ratio between solution and particles which would be meaningless if the Court's interpretation were the correct one.

5. Gewecke proposes the use of crystal water containing solid aluminum oxide particles which latter could not exist if the particle bed were hot, and

6. Continuous decomposition of the kind proposed by the Court would require the availability of a highly complex decomposer. Such decomposers were not in existence in 1927, the year the Gewecke application was filed.

By referring to the record, the brief also documents that the Court's findings are wrong and contrary to the record in respect to the following points:

*Appendix G*

1. Defendant's experts did *not* give testimony as to the temperature of the bed of particles, but testified that they were not able to give an intelligible interpretation of Gewecke's intentions.

2. Gewecke does form intrinsic steam which is intermingled with nitric acid vapor, but he must also add extraneous steam to obtain high nitric acid recovery, resulting in dilution of the acid.

3. Gewecke's process, although continuous, is a multistep process, and

4. Gewecke's *Chemiker Zeitung* process removes a major portion of the nitric acid in the evaporator while the residual material is treated in the calciner at the intense heat of 300-400°C, which is indicative of the presence of basic aluminum nitrate.

It is thus crystal clear that the Court not only seriously misread the meaning and intent of the Gewecke patent to plaintiffs' detriment, but also imputed to plaintiffs interpretations and statements which they did not make. Since these interpretations and statements form the basis on which the Court rests its conclusion, it is respectfully urged that plaintiffs are entitled to the relief here sought.

The sole ground on which claims 7 and 9 have been invalidated is the allegedly hot agitated bed of the Gewecke patent, which apparently is also conjecturally incorporated by the Court into the flow sheet of *Chemiker Zeitung*. If the Gewecke patent fails as reference, claims 7 and 9 must thus be valid. Since the Court has found infringement of claims 7 and 9, if valid, a finding of validity of these claims entitles the plaintiffs to recover.

The Court had conceded the cloudy phraseology and *lacunae* that do exist in the Gewecke patent and has also stated that the patent would come under the *Badowski* doctrine "if more than one construction are all intelligible". Plaintiffs' interpretation cannot, by any stand-

ard, be dismissed as unintelligible. This is overwhelmingly established not only by the brief but also by the opinions attached to the Toren affidavit, each of which supports plaintiffs' interpretation and rejects that of the Court.* The *Badowski* doctrine is therefore clearly applicable and the Gewecke patent hence cannot serve as an invalidating reference.

Accordingly, it is respectfully urged that this motion be granted.

Respectfully submitted,

DAVID TOREN
Attorney for Plaintiffs

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* If the Court should deem it desirable or necessary, plaintiffs are prepared to make the authors of the opinions available for cross-examination, *e.g.* by interrogatories.

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## APPENDIX H

### Letter to Scientists Written by Petitioners' Counsel on October 21, 1969

(PHOTOSTATS)

(See opposite ☛)

APPENDIX H

McGLEW AND TOREN

*Counselors at Law*

JOHN J. McGLEW
DAVID TOREN
ALFRED E. PAGE
(D.C. BAR ONLY)
BERNARD X. McGEADY
MARION R. TUTTLE

28 WEST 44TH STREET, NEW YORK, N.Y. 10036

PATENT AND TRADEMARK LAW
CABLE ADDRESS: PATENTEX
TEL. WISCONSIN 7-1317
1518

October 21, 1969

VERY URGENT

I am writing to you with a personal request:

Enclosed you will find copy of German Gewecke patent 556,882 and a literal English translation thereof.

You will note that the patentee suggests the jet spraying of hot (135°C) aluminum nitrate solution on a bed of agitated aluminum oxide particles. The resulting mixture is decomposed into nitric acid and aluminum oxide. You will also note that the temperature of the agitated aluminum oxide particles at the time of spraying is not mentioned in the patent.

In a court proceeding presently pending in the United States, the following two interpretations have been advanced:

(1) The agitated aluminum oxide particles on which the hot aluminum nitrate solution is sprayed are continuously maintained at a temperature at or above the temperature of thermal decomposition of aluminum nitrate, which is about 180°C. The agitation of the bed of aluminum oxide particles under the spray of aluminum nitrate solution serves to coat the particles with the solution, the water and nitric acid flashing off, and aluminum oxide remaining behind as a solid, continuously laminating the particles of the original bed.

(2) Aluminum oxide particles, which are maintained at a temperature below the thermal decomposition temperature of aluminum nitrate, form a bed on a moving conveyor, such as a screw conveyor or the like, which agitates the particles. The conveyor moves past a spraying station where the hot aluminum nitrate solution is sprayed on the agitated particles to form a solid mixture of aluminum oxide-aluminum nitrate solution. The conveyor then conveys the solid mixture to a decomposer where decomposition into nitric acid and aluminum oxide takes place.

Please let me know briefly whether, in your opinion, both interpretations are supported by the patent disclosure. If not, please indicate the interpretation which you consider to be more intelligible.

Since I do not wish to influence your answer, I am not supplying additional information.

I intend to submit the original of your answer to the court. For this purpose, please include a brief statement as to your academic background and professional experience.

Thank you for your cooperation.

Very truly yours,

David Toren

Encls.

DT:hl

# APPENDIX I

## Court of Claims Order on Motion under Rule 152 dated April 24, 1970

IN THE

UNITED STATES COURT OF CLAIMS

No. 350-61

—o—

ERNEST SAMUEL NOSSEN and E. S. NOSSEN LABORATORIES, INC.

v.

THE UNITED STATES

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Before COWEN, Chief Judge, LARAMORE, DURFEE, DAVIS, COLLINS, SKELTON and NICHOLS, Judges.

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ORDER

This case comes before the court on letters dated March 25, 1970 and April 10, 1970 from the plaintiffs' attorney to the Chief Judge of the court, which letters are treated as a motion under Rule 152 for relief from the judgment entered herein on October 17, 1969 dismissing plaintiffs' petition. Upon consideration thereof, together with the letter responses filed by the defendant thereto on April 7 and 15, 1970, the court finds, on the materials submitted on the motion, that, after the remand order of January 24, 1968, then Trial Commissioner Lane did not refuse to hear further evidence (including tests) relating to the Gewecke

patent and did not rule that he would only hear evidence in respect to the two Gewecke articles.

Also, as shown by the materials submitted by both parties on the instant motion, prior to the remand order of January 24, 1968, plaintiffs' counsel (Mr. Toren) had used, in his presentation to the court, the term "Gewecke publications" to include the Gewecke patent and the two Gewecke articles, and he also used the term "Gewecke publications" in the same sense in his presentation to the trial commissioner after the remand order; it is clear, therefore, that plaintiffs' counsel clearly understood the term "Gewecke publications" in the remand order to include the patent as well as the two articles.

Nevertheless, plaintiffs' counsel, although now asserting for the first time (after denial of the petition for rehearing) that he was denied by the trial commissioner the right to produce evidence on the Gewecke patent contrary to the terms of the remand order, never sought review by the court of that asserted denial, either by way of an interlocutory request to review the alleged order denying the right or in his exceptions to (and argument on) the trial commissioner's supplemental report.

IT IS THEREFORE ORDERED that plaintiffs' instant motion under Rule 152 be and the same is denied.

By the Court

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*Chief Judge*

Apr. 24, 1970

# APPENDIX J

## Constitutional and Statutory Provisions and Rules Involved

The Fifth Amendment of the Constitution of the United States reads as follows:

PROVISIONS CONCERNING PROSECUTION, TRIAL AND PUNISHMENT.—PRIVATE PROPERTY NOT TO BE TAKEN FOR PUBLIC USE, WITHOUT COMPENSATION.

No person shall be held to answer for a capital or other infamous crime unless on a presentment or indictment of a Grand Jury, except in cases arising in the land or naval forces, or in the militia, when in actual service, in time of war or public danger; nor shall any person be subject for the same offense to be twice put in jeopardy of life or limb; nor shall be compelled in any criminal case to be a witness against himself, nor be deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use without just compensation.

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Title 28 of the United States Code provides in pertinent part:

> § 1498. Whenever an invention described in and covered by a patent of the United States is used or manufactured by or for the United States without license of the owner thereof or lawful right to use or manufacture the same, the owner's remedy shall be by action against the United States in the Court of Claims for the recovery of his reasonable and entire compensation for such use and manufacture.
>
> For the purposes of this section, the use or manufacture of an invention described in and covered by

a patent of the United States by a contractor a subcontractor, or any person, firm, or corporation for the Government and with the authorization or consent of the Government, shall be construed as use or manufacture for the United States.

Title 35 of the United States Code provides in pertinent part:

§ 101. Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

§ 102. A person shall be entitled to a patent unless—

(a) The invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or

(b) The invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States, * * *

* * *

§ 103. A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter

pertains. Patentability shall not be negatived by the manner in which the invention was made.

* * *

§ 282. A patent shall be presumed valid. The burden of establishing invalidity of a patent shall rest on a party asserting it.

The following shall be defenses in any action involving the validity or infringement of a patent and shall be pleaded:

* * *

(2) Invalidity of the patent or any claim in suit on any ground specified in part II of this title as a condition for patentability,

* * * *

Rule 152 of the Court of Claims reads as follows:

RELIEF FROM JUDGMENT OR ORDER

(a) *Clerical Mistakes*: Clerical mistakes in judgments, orders, or other parts of the record, and errors therein arising from oversight or omission, may be corrected by the court at any time on its own initiative or on the motion of any party and after such notice, if any, as the court orders.

(b) *Mistakes; Inadvertence; Excusable Neglect; Newly Discovered Evidence; Fraud, etc.; Response; Reply*: On motion conforming to Rule 51 and upon such terms as are just, the court may relieve a party or his legal representative from a final judgment, order, or proceeding for the following reasons: (1) mistake, inadvertence, surprise, or excusable neglect; (2) newly discovered evidence which by due diligence could not have been discovered in time to move for a new trial under Rule 151(c); (3) fraud (whether heretofore denominated intrinsic or extrinsic), misrepresentation, or other misconduct of an adverse party; (4)

the judgment is void; (5) the judgment has been satisfied, released, or discharged, or a prior judgment upon which it is based has been reversed or otherwise vacated, or it is no longer equitable that the judgment should have prospective application; or (6) any other reason justifying relief from the operation of the judgment. The motion shall be made within a reasonable time, and for reasons (1), (2), and (3) not more than 1 year after the judgment, order, or proceeding was entered or taken. A motion under this paragraph (b) does not affect the finality of a judgment or suspend its operation. This rule does not limit the power of the court to entertain an independent action to relieve a party from a judgment, order, or proceeding, or to set aside a judgment for fraud upon the court. The relief provided by this rule shall be in addition to the relief available to the United States under Rule 151(a)(2). A response to a motion under this paragraph may be filed within 15 days after the motion is served. A reply may be filed within 10 days after the service of the response. (See Rule 214(e) as to duplication and number of copies.)

# APPENDIX K

## Nossen Patent in Suit

(PHOTOSTATS)

(See opposite ☛ )

United States Patent Office 2,737,445 Patented Mar. 6, 1956



2,737,445

# PROCESS FOR THE THERMAL DECOMPOSITION OF METAL NITRATES

Ernest Samuel Nossen, Paterson, N. J.

No Drawing. Application September 14, 1951, Serial No. 246,723

12 Claims. (Cl. 23—158)

This application is a continuation-in-part application of the U. S. patent application Serial No. 92,079, filed on May 7, 1949, and which has issued as Patent No. 2,681,268, dated June 15, 1954, for "Process for the Manufacture of Manganese Dioxide and Depolarizers for Electric Cells," and of the U. S. patent application Serial No. 199,181, filed on December 5, 1950, for "Separation of Manganese from Iron and other Undesirable Ore Components."

This invention relates to metal nitrates and more particularly to the thermal decomposition of metal nitrates.

In the course of thermal decomposition of most of the metal nitrates into oxides or metals, $N_2O_4$ and/or $NO_2$, a heavy brown poisonous gas, is formed. A huge installation would be required to convert said $N_2O_4$ and/or $NO_2$ into nitric acid in order to recover the acid. Therefore, this method is not applied as a general procedure.

An object of the invention is to provide a process for the thermal decomposition of metal nitrates, by means of which the nitric acid may be readily recovered at negligible cost.

Other objects and details of the invention will be apparent from the following description.

Hereinafter the symbol "M" is used to broadly indicate a metal.

If $MNO_3$ (a metal nitrate) is heated above the temperature of decomposition in the presence of steam, the following reactions take place:

(1) $$2MNO_3 \rightarrow M_2 + N_2O_5$$

(2) $$N_2O_5 + H_2O \rightarrow 2HNO_3$$

In said equations $N_2O_5$ represents nitric acid anhydride being unstable as such and having, like all of the anhydrides, the tendency to combine with water to form the true acid in an exothermic reaction. If no water is present, the nitric acid anhydride $N_2O_5$ is rapidly decomposed into $N_2O_4$ and O according to the reaction.

(3) $$N_2O_5 \rightarrow N_2O_4 + O$$

Then, $N_2O_4$ is dissociated into $2NO_2$, the extent of dissociation depending on the temperature. However, this reaction can be slowed down by a high amount of oxygen present in the gas atmosphere bringing the equilibrium to the left side and protecting the $N_2O_5$, until it combines with water according to Reaction 2. A sufficient amount of water has to be present to form the nitric acid $HNO_3$ and to protect same against splitting. The nitric acid must be removed from the reaction zone as fast as possible so as to prevent Reaction 2 from going to the left side under the influence of too high a temperature. This feature may be obtained by subjecting the gaseous products to a sucking action or by adding a gas, preferably a gas containing oxygen, such as air, or by using an excess of steam. The nitric acid is recovered from the gaseous reaction products by condensation.

If the metal nitrates are decomposed in accordance with the invention in the manner described above, Reaction 3



does not take place and no brown fumes of $N_2O_4$ and/or $NO_2$ will be noticed in the decomposition unit.

Instead of using dry metal nitrates and introducing steam into the decomposition unit, it may be more convenient to use an aqueous metal nitrate solution and to effect the decomposition in such a way that always a sufficient quantity of water is present; this may be accomplished by introducing continuously fresh metal nitrate solution into the decomposition unit. Since, in such a case, the reaction takes place in a thin film of material, a complete decomposition may be obtained. Furthermore, the decomposition of a metal nitrate solution renders unnecessary the steps of concentrating and crystallizing the solid salt.

In the event that a metal is capable of forming two different oxides, for example nickel which may form NiO or $Ni_2O_3$, the higher oxides will be formed if the decomposition of the metal nitrates solution takes place in the presence of a gas containing oxygen. If it is desired to produce the lower oxides, an inert gas, such as nitrogen or steam, is used alone, instead of a gas containing oxygen.

If a nitrate of a noble metal is decomposed, a metal is formed by the decomposition process as one of the decomposition products.

The decomposition process according to the invention may be applied to all metal nitrates which in their anhydrous state develop nitrogen dioxide ($NO_2$ and/or $N_2O_4$) when heated.

The decomposition temperature depends on the nitrate to be treated. The decomposition temperature may be as low as 60° C., for example for the decomposition of ferrous nitrate, or as high as 600° C., for example for the decomposition of calcium nitrate. However, the nitrates of the most important metals decompose at a temperature between 120° C. and 250° C.

The method of decomposition according to the invention may be used to form oxides of the following metals: Al, Be, Bi, Cd, Ce, Cr, Co, Cu, Ga, Hg, In, Fe, Pb, Mn, Ni, Sn, Te, U, Zn, and to form the metals themselves such as: Ag, Au, Pt.

The metal nitrates to be decomposed in accordance with the decomposition process of the invention may be obtained in any suitable manner, for example by dissolving a metal oxide or a metal in nitric acid. The decomposition process according to the invention renders possible recovery of the nitric acid used in the preparation of the nitrate solution.

Preferably, the formation of the metal oxide from its nitrate solution and the recovery of the nitric acid are carried out in a single unit of equipment. In a preferred embodiment, such a unit comprises a housing enclosing an internally heated rotatable drum on which the reaction takes place, a feed tank, for a supply of metal nitrate solution, connected with said drum, a knife arranged for taking off the oxide formed on the drum, a first aperture on said housing connected with a pipe for leading the gases containing nitric acid vapors to a condenser and a container for collecting the nitric acid in its liquid form, and a second aperture on said housing for the discharge of the solid material obtained by the decomposition; said second aperture may also be used as an inlet for steam and/or gas and/or air. The drum is heated to a temperature at least as high or higher than the decomposition temperature of the metal nitrate to be decomposed.

If desired, a decomposition equipment of different construction may be used for the performance of the method according to the invention, provided, of course, that the equipment permits the application of the above mentioned principles.

The thermal decomposition of metal nitrates according to the invention may be used as a production step in many instances. For example, it may be used: in the

recovery of metals from ore sometimes combined with a selective reduction and leaching of the ore in nitric acid, or in the production of metal oxides for pigment purposes, such as for the production of ZnO, $Al_2O_3$ and $Cr_2O_3$, or in the production of catalysts, for example Ni on an alumina support, by decomposing a nickel nitrate solution containing the alumina in suspension or by decomposing a solution of nickel and aluminum nitrate, or in the production of metal powders by reducing the formed pure metal oxides in a reducing atmosphere to powder metal, or in the formation of basic nitrates, also called subnitrates or oxynitrates by decomposing a suitable metal nitrate solution at a lower temperature, making free only part of the nitric acid combined with the metal.

The process according to the invention will now be described by several examples, but it should be understood that these examples are given by way of illustration rather than by way of limitation, and that many variations may be made without departing in any way from the spirit of the invention.

I

(*a*) 10 liters of an aluminum nitrate solution containing 213 grams of $Al(NO_3)_3$ per liter are fed continuously to a decomposition equipment as described above. The drum of the equipment is heated to a temperature of 190° C. Simultaneously herewith air is sucked through the system of the equipment for the removal of the gases out of the hot reaction zone. Said gases containing nitric acid vapors are cooled down to about room temperatures in the condenser connected with the decomposition equipment. The nitric acid liquified in the condenser is collected in a container. The gases are freed from small amounts of nitric acid vapors, which may be carried away with the air, by washing same in a second container filled with water. The aluminum oxide taken off from the drum of the equipment by the knife and ground is a very white fine powder.

After the test, the content of nitric acid in both containers has been determined by titration as 1796 grams. Since 1890 grams of nitric acid may be liberated theoretically from 2130 grams of $Al(NO_3)_3$, the percentage of the recovery of nitric acid amounts to 95%.

In the same equipment and according to the same method the following metal nitrate solutions have been decomposed:

(*b*) A ferric nitrate solution at a temperature of 125–135° C.,

(*c*) A zinc nitrate solution at a temperature of 220–225° C.,

(*d*) A cobalt nitrate solution at a temperature of 170–185° C.,

(*e*) A nickel nitrate solution at a temperature of 230–250° C.,

(*f*) A chromium nitrate solution at a temperature of 175–200° C.,

(*g*) A manganese nitrate solution at a temperature of 190–210° C.,

(*h*) A bismuth nitrate solution containing 20% free nitric acid at a temperature of 120–130° C.; in this case, owing to the decomposition at a comparatively low temperature, only part of the nitric acid combined with the bismuth is liberated, so that the bismuth nitrate solution is decomposed into the oxynitrate $BiONO_3 \cdot H_2O$ and gases containing nitric acid vapors.

In the decompositions according to (*b*)–(*h*) the recovery of the nitric acid amounts to 95–99%.

II

(*a*) Lead nitrate is decomposed in a decomposition equipment comprising an externally heated tube with a temperature control, an attached condenser, a first container and a second container connected with the condenser and with each other, said first container being empty, said second container being filled with water and Raschig rings.



3.3 grams of $Pb(NO_3)_2$ are brought into the tube which is heated at a temperature of 370–400° C. Simultaneously herewith steam is blown over the lead nitrate. The steam passing through the equipment is condensed together with the nitric acid vapors developed during the decomposition. The white lead nitrate crystals turn into yellow lead oxide, while the nitric acid is formed and carried out of the reaction zone by the steam. It has been determined by tests that the nitric acid collected in both containers as a result of the decomposition described above amounts to 1.24 grams of $HNO_3$ and that, consequently, the recovery of the nitric acid amounts to 98.5%.

In the same equipment and according to the same method as described in the preceding paragraphs of Example II*a*, the following metal nitrates have been decomposed:

(*b*) Mercuric nitrate was decomposed into red mercuric oxide (HgO) and nitric acid at a temperature of about 400° C.; nitric acid recovery was 99%.

(*c*) Cadmium nitrate was decomposed into brown cadmium oxide (CdO) and nitric acid at a temperature between 350 and 380° C.; nitric acid recovery was 94%.

The thermal decomposition of metal nitrates according to the present invention has great advantage over the hitherto customary method of production of metal oxides, which is rather complicated and expensive. According to the hitherto known method a solution of a metal salt is treated with an equivalent quantity of an alkaline hydroxide, whereby the hydroxide of the metal is precipitated. The filtration of this, in most cases gelatinous, precipitate and the washing thereof for removing the formed alkaline salt are difficult and time consuming steps causing a serious draw back at production scale. The acid combined with the metal in the salt and the added alkaline are a complete loss. In the process according to the present invention, however, the acid is quantitatively recovered and no alkaline is needed. The material leaving the decomposition unit may be used as such if the nitrate solution was purified prior to the decomposition process, otherwise it is washed and filtered very easily. The metal oxides produced in this manner under development of gases have a low bulk density and may be compared with oxides obtained by heating the hydroxides made in the usual manner.

I have described preferred embodiments of my invention, but it is understood that various changes may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

I claim:

1. A process for the thermal decomposition of a metal nitrate of which the metal is selected from the electromotive series starting with magnesium towards and including the noble metals and which forms the unstable $N_2O_5$ as primary gaseous product when decomposed, into a solid product and nitric acid comprising the steps of: subjecting the metal nitrate to a temperature higher than the temperature of its decomposition in the presence of a continuous flow of steam, liberating unstable $N_2O_5$ and causing its reaction with said steam before it breaks down into lower nitric oxides, to form nitric acid vapors and a solid product and condensing said nitric acid vapors for recovery of the nitric acid in its liquid form.

2. A process for the thermal decomposition of a metal nitrate of which the metal is selected from the electromotive series starting with magnesium towards and including the noble metals and which forms the unstable $N_2O_5$ as primary gaseous product when decomposed, into a solid product and nitric acid comprising the steps of: subjecting the metal nitrate to a temperature higher than the temperature of its decomposition in the presence of a continuous flow of steam and an added gas, liberating unstable $N_2O_5$ and causing its reaction with said steam

before it breaks down into lower nitric oxides, to form nitric acid vapors and a solid product and condensing said nitric acid vapors for recovery of the nitric acid in its liquid form.

3. In a process as claimed in claim 2 wherein the added gas is an inert gas.

4. In a process as claimed in claim 2 wherein the added gas is a gas inert to nitric acid under the conditions of operation.

5. In a process as claimed in claim 2, wherein said added gas contains oxygen.

6. A process for the thermal decomposition of an aqueous metal nitrate solution, containing a metal nitrate of which the metal is selected from the electromotive series starting with magnesium towards and including the noble metals and which forms the unstable $N_2O_5$ as primary gaseous product when decomposed, into a solid product and nitric acid comprising the steps of: subjecting the metal nitrate solution to a temperature higher than the decomposition temperature of said metal nitrate, liberating unstable $N_2O_5$ and steam and causing a reaction between said $N_2O_5$ and said steam before said $N_2O_5$ breaks down into lower nitric oxides to form nitric acid vapors and a solid product and condensing said nitric acid vapors for the recovery of the nitric acid in its liquid form.

7. In a process as claimed in claim 6 wherein said aqueous solution of the metal nitrate is subjected to said temperature in form of a thin film.

8. A process for the thermal decomposition of an aqueous metal nitrate solution, containing a metal nitrate of which the metal is selected from the electromotive series starting with magenesium towards and including the noble metals and which forms the unstable $N_2O_5$ as primary gaseous product when decomposed, into a solid product and nitric acid comprising the steps of: subjecting the metal nitrate solution to a temperature higher than the decomposition temperature of said metal nitrate in the presence of an added gas, liberating unstable $N_2O_5$, and steam and causing a reaction between said $N_2O_5$ and said steam before said $N_2O_5$ breaks down into lower nitric oxides to form nitric acid vapors and a solid product and condensing said nitric acid vapors for the recovery of the nitric acid in its liquid form.



9. In a process as claimed in claim 8 wherein said aqueous solution of the metal nitrate is subjected to said temperature in form of a thin film.

10. In a process as claimed in claim 8 wherein the added gas is an inert gas.

11. In a process as claimed in claim 8 wherein the added gas is a gas inert to nitric acid under the conditions of operation.

12. In a process as claimed in claim 8, wherein said added gas contains oxygen.

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# UNITED STATES PATENT OFFICE
# CERTIFICATE OF CORRECTION

Patent No. 2,737,445 March 6, 1956

Ernest Samuel Nossen

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 1, line 40, for "$NMO_3$" read -- $MNO_3$ --; line 43, after the arrow, for "$M_2$" read -- $M_2O$ --.

Signed and sealed this 11th day of February 1964.

SEAL)
test:

RNEST W. SWIDER
testing Officer

EDWIN L. REYNOLDS
Acting Commissioner of Patents